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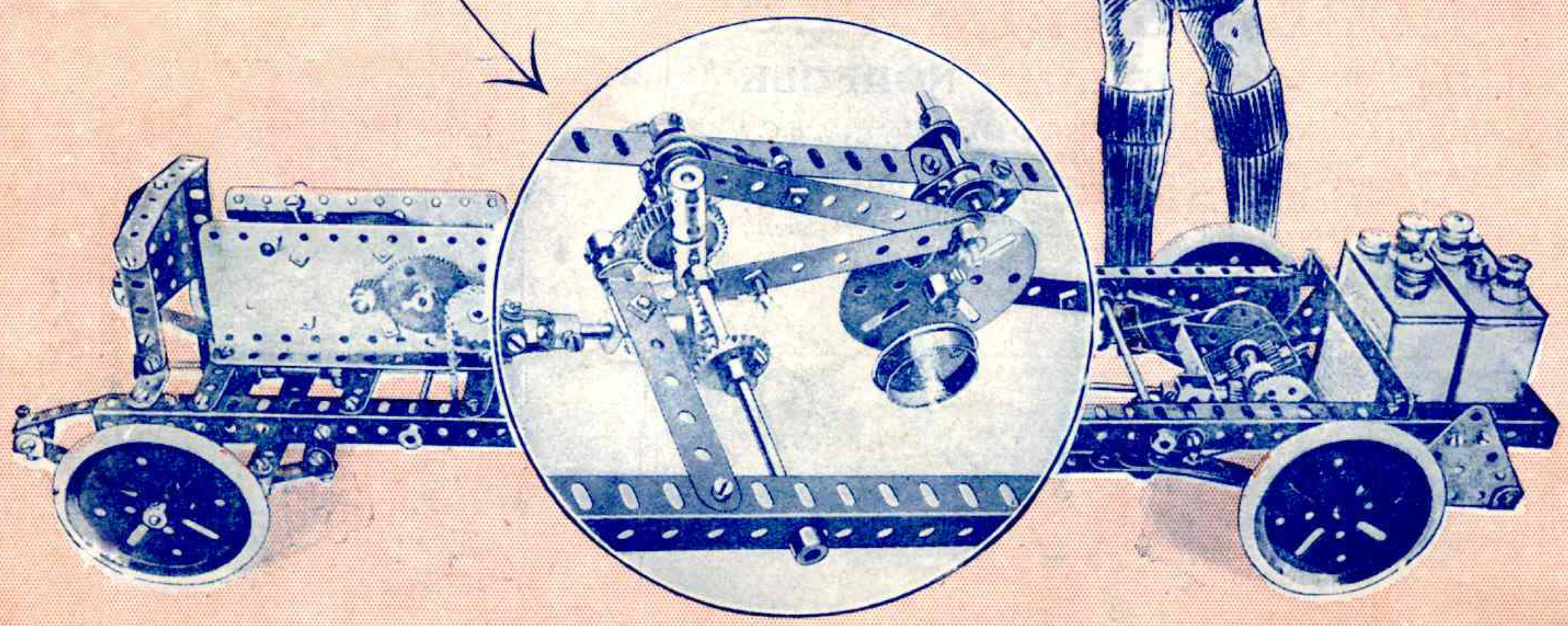
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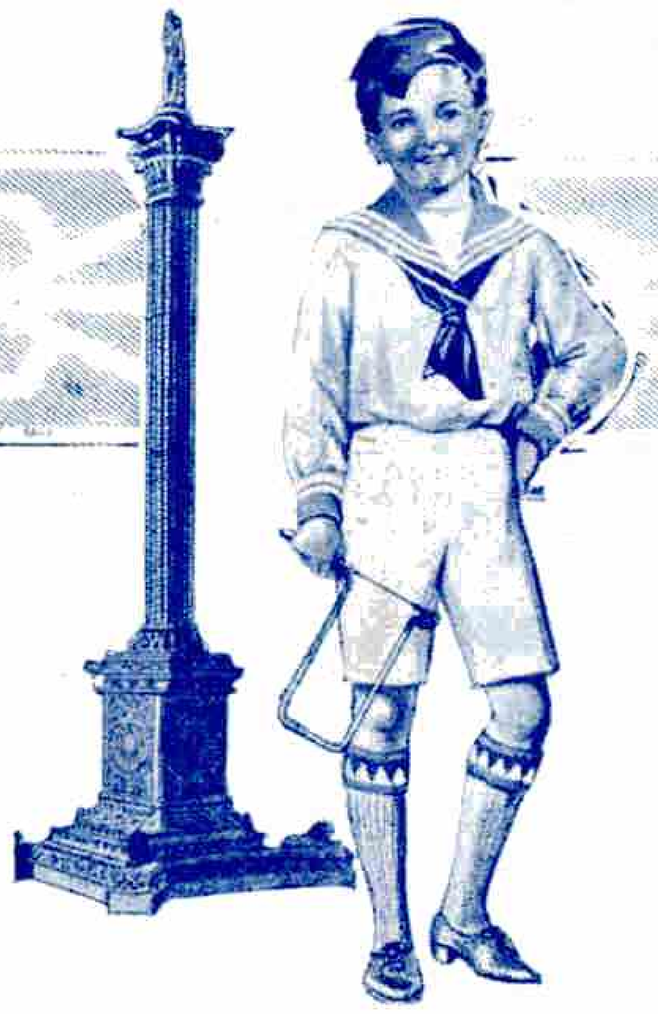




The New Torque Converter

(see page 90)





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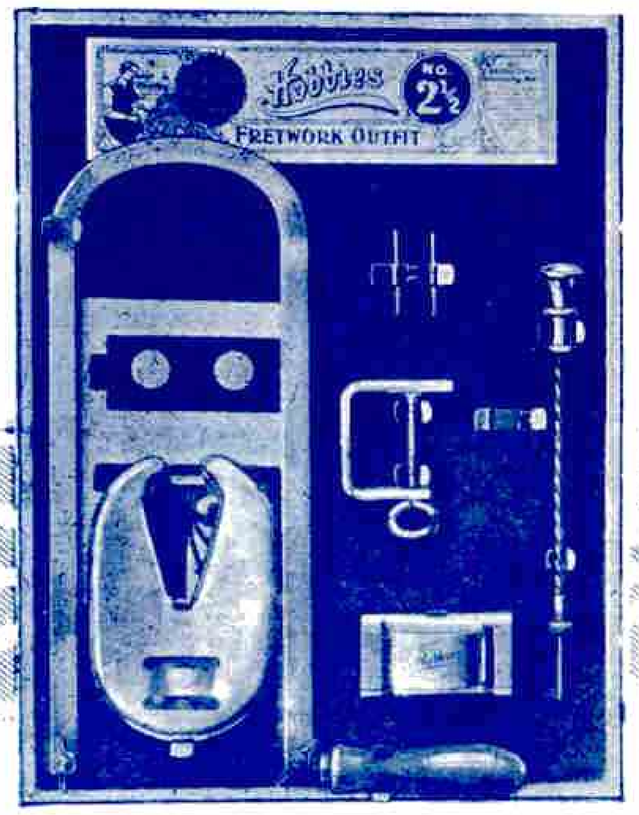
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EDITORIAL OFFICE
Binns Road,
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MECCANO MAGAZINE

PUBLISHED IN THE INTERESTS OF BOYS



EDITORIAL

AS my readers know, the Meccano Model-Building Competition is this year being run as a Championship Contest. As the Competition closes this month I thought it would be interesting to say a few words on this page in regard to the meaning of the word "Champion." I do not refer to the dictionary meaning of the word, which I find is "*One who, by defeating all rivals, has obtained an acknowledged supremacy,*" although a good deal might be said about this. I really wanted to write of the broader meaning of the word "Champion," and to remind you of the ancient glories associated with it.

An Ancient Word

There has been a healthy spirit of rivalry in almost every walk of life, from very early times. Those of my readers who have studied ancient history have read of the Olympic Games, the greatest of the national festivals of the ancient Greeks. The Olympic Games took place once every four years, the events lasting five days. Open to all free-born Greeks, the Games attracted champion athletes from all parts of Greece, who attended to show their strength and skill. Thousands of spectators, who came from all parts, watched the athletes competing against each other in wrestling and boxing bouts, long and short foot races, jumping, throwing the discus and javelin, chariot races and similar contests. The successful competitors received a wreath of olive and were maintained for the remainder of their lives by their native cities, and thus became the champion athletes of the cities concerned. As the Olympic Games were held long before 700 B.C. this is a very early example of Championship, expressing the spirit of rivalry.

Early Greek Champions

There have been many other champions since those early days. Space forbids more than a mention of the Seven Champions of Christendom, of whom you will read in mediæval romances. These were the seven national saints, and included St. George of England, St. Andrew of Scotland and St. David of Wales. Then there is the interesting story of the King's Champion. As the Champion of the Realm he challenged to single combat any person who should dispute his sovereign's title to the crown. This challenge took place at the Coronation banquet, when the Champion, in full armour with his helmet trimmed with red, white and blue plumes, rode into the famous Westminster Hall in London on the second best charger from the royal stables. While the heralds were proclaiming the challenge from the entrance to the Hall, the Champion threw down his gauntlet three times, and anyone who wished to accept the challenge only had to pick up the glove. The office of King's Champion is of great antiquity, and although the custom of the challenge was discontinued in George IV.'s time, the office of King's Champion still exists.

The King's Champion

No doubt, many of you have read the fascinating stories of King Arthur and the Knights of the Round Table; of how these valiant knights devoted their lives to the cause of chivalry. They were the champions of the weak and oppressed, whom they were ever ready to defend against cruelty and injustice. These champions of the Age of Chivalry were fine characters and stand out as shining lights in the story of our country. In after years their spirit of bravery and honour did not die, but continued to live in the hearts of our countrymen. When the sacred places in the Holy Land were being destroyed by infidels, Englishmen were ready to brave danger and death in a strange country, and lead the first expedition into Palestine. The story of the Crusades is one of the most wonderful ever written. When we think of the gallant deeds and heroic characters of the Crusaders, we cannot help but feel proud that these champions of the Faith were our own countrymen.

Champions of Chivalry and Faith

Throughout the centuries, we find there have been champions of many kinds, although it is true these men were not always given the title of "Champion." There were champions of a belief, as Thomas á Becket. Champions of a nation, such as Nelson, Wellington, Clive, and Cecil Rhodes. Champions of industry, champions of science and champions of art—each of whom had his difficulties to overcome, as the earlier champions had their battles to fight. To-day we have champions of yet another kind—men who by hard and repeated tests have proved themselves unequalled in the world of sport. Boxing, swimming, running, fencing, golf, lawn-tennis and every other form of sport, has its champion, who proves his claim to the title by being ready to defend it against any challenger. Strong and physically perfect, as the Olympian athletes of old, these modern champions have not attained the highest standard of perfection without a vast amount of hard work and strenuous training.

Modern Champions

I think I have said sufficient for you to understand that there is a wealth of meaning in the word "Champion," and you will, perhaps, enter with greater zest into the competition for the Champion Model-Builder of your country, full particulars of which are announced on page 109. Thousands of boys all over the world will be competing against each other for the proud title of Meccano Champion—an honour well worth striving for. Although you cannot be a King's Champion, nor can you be a champion athlete of ancient Greece, you can be a champion model-builder and gain honour by winning the coveted Championship Cup for your own particular group. You may not be maintained free for life by the people of your home town, as were the Olympian champions, but there is no doubt that your friends will honour you, and your parents and relatives will be proud of you for having "defeated all rivals and obtained an acknowledged supremacy."

The Meccano Champions

Next Month:

NEW SERIAL ARTICLE :—
The Story of Iron and Steel

FAMOUS ENGINEERS :—
George Stephenson (Part IV.)

ELECTRICITY :—
Benjamin Franklin's Famous Experiment with Lightning

STAMP COLLECTING :—
Watermarks. Some Interesting Recent Issues

INTO THE LAND OF FUN :—
A New Meccano Model

WHAT BROADCASTING MEANS :—
(II) Covering Britain with Broadcast

COMPETITIONS. GUILD NEWS. CYCLING NOTES, PUZZLES, and other regular features



III. GEORGE STEPHENSON, the Man Who Gave Railways to the World.

THE establishment of the Stockton and Darlington Railway had been a great achievement and we may imagine that Stephenson was justly proud of his work. He had proved that he not only thoroughly understood the working and construction of a locomotive, but he had also shown himself a capable civil engineer, having surveyed the land for the railway and superintended the laying of the track. The experience he gained with the Stockton and Darlington Railway was of inestimable value to him in after life, and more particularly so in the difficult tasks that he was subsequently called upon to face.

Of these, perhaps the most difficult was the conquest of Chat Moss, a treacherous bog between Manchester and Liverpool. The story of this engineering feat is one of the greatest triumphs in the history of engineering.

George Stephenson possessed unlimited perseverance—the essential quality for the making of an engineer. Early in life, when working as a brakesman at a colliery, he adopted as his motto the one word "Persevere." Keeping this before him as a shining light, he gradually climbed the ladder of life, rising from being a cow-herd at 2d. per day, to be one of the greatest engineers the world has ever known. His life is a worthy example of perseverance, thoroughness and enthusiasm that every Meccano boy may well keep before him.

The Liverpool and Manchester Railway Projected

The demand for a railway between Manchester and Liverpool increased as time went by, for the trade and manufactures of South Lancashire were growing extensively. This expansion was principally due to the invention of the steam engine and of the spinning jenny, which resulted in an enormous increase in manufactured cotton goods around Manchester and in other parts of Lancashire. The raw cotton, brought by sea to the port of Liverpool, had to be transported to Manchester and the spinning districts around it. The only method of transport at that time was by road, or by the Bridgewater Canal. The success of the Stockton and Darlington Railway, however, suggested the possibility of constructing a line between Manchester and Liverpool, as it was realised that a railway would afford a more satisfactory means of communication between the two towns than either the road or the canal.

Those who were proposing to construct a railway consulted Stephenson on the matter, and he eventually came to Liverpool to take charge of the work. The construction of this line illustrates very fully the qualities required in an engineer, for the work was obstructed by difficulties of every nature. Apart from the mechanical difficulties of the locomotives themselves, there were great masses of rock to be tunnelled, and a bog that presented an apparently insurmountable obstacle to the construction of the railway. There were also political and financial difficulties that would have been sufficient to dishearten any other man than Stephenson.

Parliamentary Difficulties

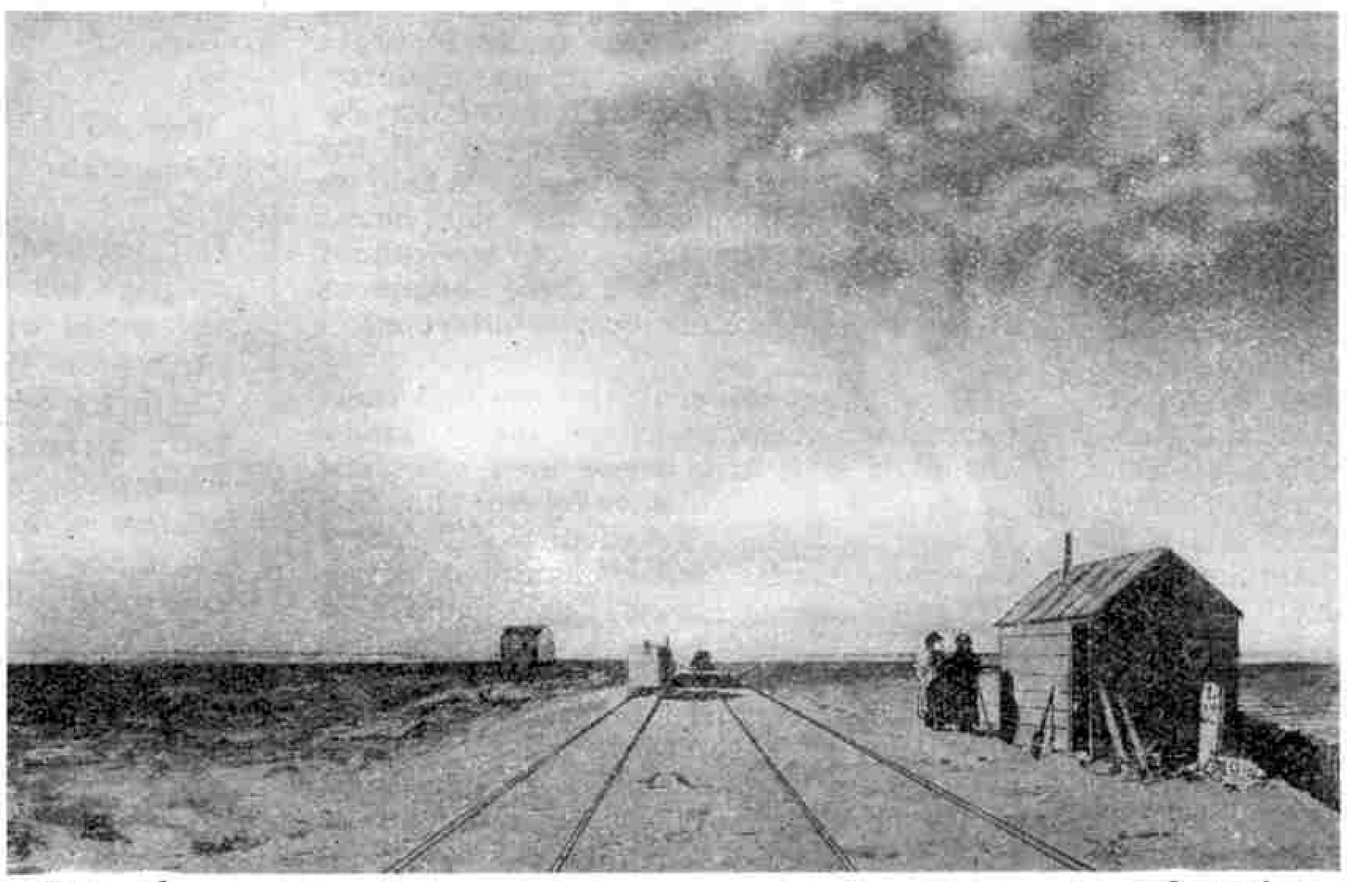
It was first necessary to obtain the sanction of Parliament to the scheme, and a Bill was promoted to this end. As may be imagined, there was considerable opposition to the Bill, not only from stage-coach owners and others who believed that the development of the railway would mean a serious financial loss to them, but also from land-owners and Lords of the Manors, through whose estates it was proposed to lay the line.

We have not space in these pages to recount the interesting story of how, step by step, Stephenson overcame every difficulty. Suffice it to say that he himself appeared before the Parliamentary Committee to throw the whole of his weight into the argument in favour of the Bill. Before one of the sittings commenced Stephenson informed the leading counsel for the Railway Company that he was confident he could make his locomotive travel at 20 miles an hour. This so alarmed the lawyer that he warned Stephenson that if he did not moderate his views and bring his proposed speed within "reasonable limits" he would not only wreck the whole of the Bill, but he himself would be regarded as a maniac fitted only for a lunatic asylum!

"Shunting" a Committee Man

Another celebrated incident occurred when Stephenson was appearing before the Committee. The inquiry was being directed to the dangers of travelling in a train going at such high speeds as nine miles an hour. One of the members of the Committee addressed the following question to Stephenson—"Suppose now one of your engines to be going along a railroad at the rate of nine or ten miles an hour, and that a cow were to stray upon the line and get in the way of the engine; would not that, think you, be a very awkward circumstance?"

"Yes," replied Stephenson with a twinkle in his eye, "very awkward—*for the cow.*" Needless, to say, the member of the Committee did not proceed further with his cross-examination, for—to use a railway phrase—he was "shunted."



From an engraving

The Dreary Waste of Chat Moss

Chat Moss : A Vast Peat Bog

On the first occasion that the Liverpool and Manchester Railway Bill came before Parliament, it was not passed by the House. A new survey of the line had to be made. The second time the Bill was brought up the promoters were more fortunate, however, and it was passed by both the Commons and the Lords, in spite of the opposition.

Stephenson removed to Liverpool to superintend the work and commenced by undertaking a task that was regarded as being impossible to satisfactorily accomplish. This was the laying of a line over Chat Moss, a great peat bog, between Manchester and Liverpool. We are better able to appreciate the difficulties that were to be overcome when we learn that the bog was some twelve miles square and was composed of a mass of decayed vegetation; the growth and decay of ages. In wet weather the bog absorbed the rain like a huge sponge, and its centre stood several feet higher than its edges. In summer, when the water evaporated, the bog was left saucer-shaped, and at all times it was impossible for a man to walk across the bog, or even stand on it. Local tradition said that the bog had originated at the time of the Flood !

A Narrow Escape

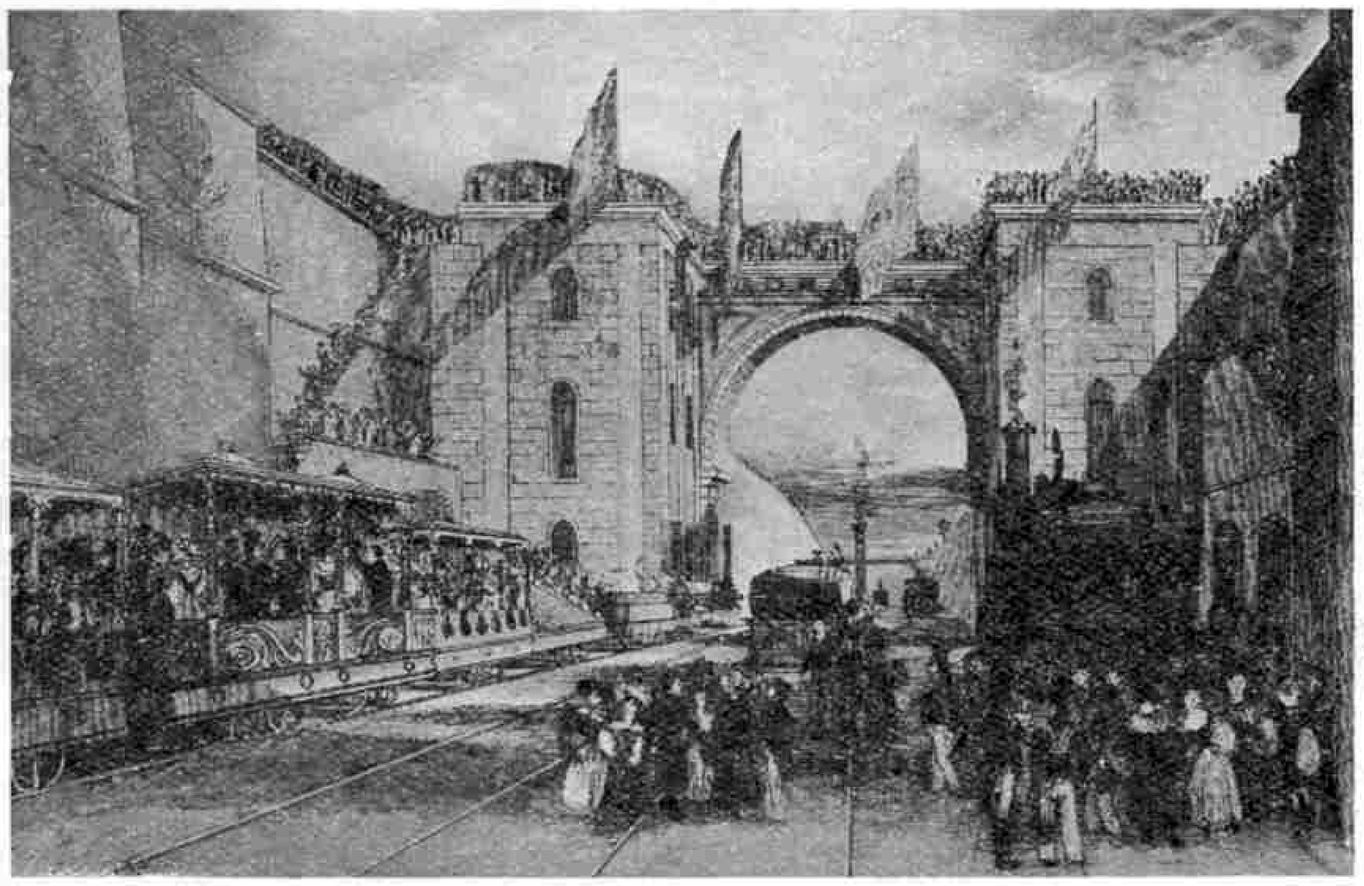
Mr. Dixon, the Resident Engineer, inspecting the bog one day, slipped off the plank on which he was walking and sank to his knees. His struggles only sent him deeper, and he would have disappeared altogether but for the fact that workmen hastened to his assistance on planks. After this experience, it is not to be wondered at that Mr. Dixon was considerably exercised in his mind as to the wisdom of his chief in endeavouring to construct a road for heavy locomotives and trains of passengers and goods across a bog that he had found incapable of supporting his own weight !

When the Bill had been before Parliament some very scathing remarks were made in regard to Stephenson's suggestion to cross Chat Moss. "The making of an embankment out of this pulpy wet moss," declared counsel, "is no easy task. Who but Stephenson would have thought of entering into it ? It is ignorance almost inconceivable. It is perfect madness to propose such a plan."

Another eminent engineer, called as expert witness by the opposition, said : "In my opinion unless a solid embankment can be built up from its bed no railway can be carried across the Moss without going to the bottom." The cost of this embankment the witness estimated would be £270,000. Another leading engineer—one of the most distinguished of his day—declared that the laying of the line across Chat Moss was "an impossible task that no man in his senses would undertake."

A Floating Railway

Stephenson was not put off by such assertions as these. He argued that just as snow-shoes distribute a man's weight over an area much greater than that occupied by his feet, so, too, would a platform built sufficiently large bear a railway track well above the bog. He did not intend to build an embankment such as was recommended, however, but to make the railway float on the surface of the bog. His idea was to construct a track of cross-sleepers, supported by a matting of heath and branches, so that the track was indeed a floating road or elongated raft across the bog.



From an old engraving

The Opening of the Liverpool and Manchester Railway, September 15, 1830. The scene at Edge Hill

Stephenson commenced his task by forming a footpath of heather across the bog, to enable the workmen to reach their work. He then strengthened this footpath so as to carry a narrow-gauge railway for the transport of materials necessary for constructing the permanent way.

Great difficulty was experienced in carrying the work to a successful conclusion, especially at the Manchester end of the line. Here the situation became alarming, for thousands of loads of heather, grass, tree branches and turf were spread on each side of the narrow pathway. These had no sooner attained the height of a few feet than the whole sank out of sight in the bog ! Time after time this was repeated, and after some weeks' work there was so little trace of the workings, that had it not been for the ever-increasing total of the wages bills, it would almost have been believed that the task had never been commenced !

Stephenson's Self-Confidence

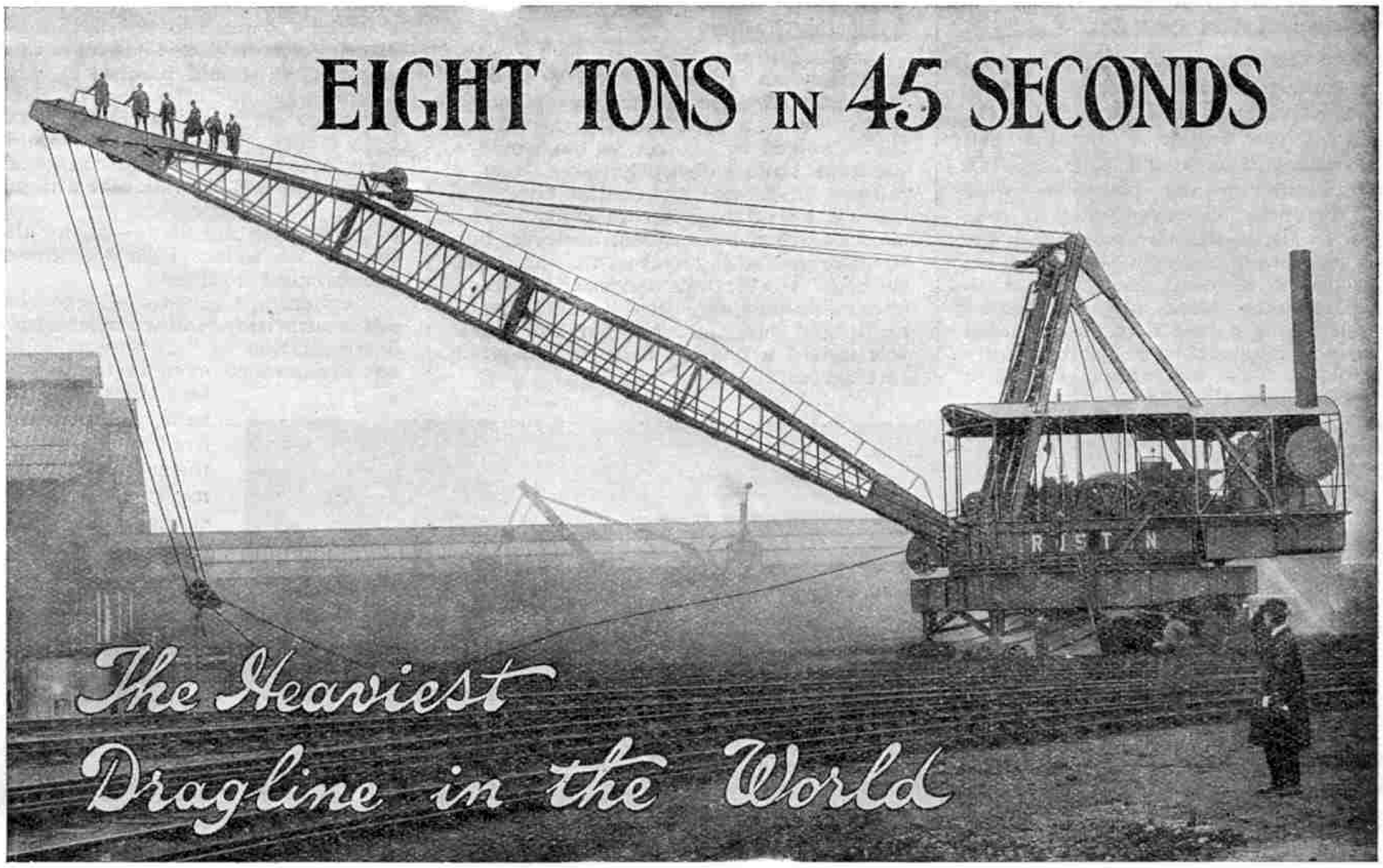
Describing this anxious time, Stephenson wrote, "After working for weeks and weeks in filling in materials to form the road, there did not yet appear to be the least sign of our being able to raise the solid embankment one single inch ; in other words, we went on filling in without the slightest apparent effect. Even my assistants began to feel uneasy and to doubt the success of the scheme. The directors spoke of it as a hopeless task and at length they became seriously alarmed—so much so indeed, that a Board meeting was held on Chat Moss to decide whether we should proceed any farther. There was no help for it, however, but to go on, as an enormous outlay had been incurred and great loss would have been occasioned had the scheme been abandoned and the line taken up another route. So the directors were compelled to go on with my plans—of the ultimate success of which I myself never for one moment doubted."

Stephenson's great confidence in himself is surprising, and we must admire his determination to "Persevere." He was not discouraged even in the face of the fact that on the one hand workmen who had lived in the district all their lives, and who might therefore be presumed to know something about local conditions, prophesied that his plan would never succeed and that by proceeding with it, he was only throwing good money after bad. Experts had declared that the task was impossible. Eminent engineers reported unfavourably upon it. Science and experience said, "If you knew as much about Chat Moss as we do, you would never have entered on so rash an undertaking. Depend upon it, all you have done and are doing will be fruitless. You must give up altogether the idea of floating a railway on the Moss and either fill in the bog and build a roadway of solid material, resting on the bottom, or else deviate the line so as to avoid Chat Moss altogether."

Success at Last !

Stephenson never lost heart, however, but true to his motto he "Persevered," and so the work went on. Load after load of material was tipped into the Moss every hour—and was swallowed up just as quickly.

At length the time came when Stephenson's wonderful optimism was rewarded, however, for the material had been doing its work out of sight, as he had said. It had been sinking through the bog and resting on the solid bottom of the Moss until gradually a bank rose above the surface. At length this bank was sufficiently long to be joined to the floating road already laid across the Moss from the Liverpool side. The road was finished by New Year's Day 1830, when the first train of passengers was drawn across it by the famous "*Rocket*." Chat Moss was vanquished, but not until over 670,000 cubic yards of turf had been used. The total cost of forming the line across the Moss was £28,000—a great difference between the £270,000 estimated by the eminent engineer mentioned above. The cost of the line across the Moss was, in fact, such that instead of it being the most expensive part of the line it was almost the cheapest.



(Continued from last month)

The bucket of a Dragline is of simple construction, and being open at the front and the top, to a certain extent resembles a coal-scuttle. The digging rope is connected to a cross-bar, above the front of the bucket, the hoisting rope being fixed to the body of the bucket furthest away from the machine. The bucket is emptied by holding it up on the hoisting rope, and releasing the digging rope. This allows the bucket to tilt forward, and so discharges the contents from the open mouth.

In the cycle of operations of a Dragline the bucket is first lowered, at its extreme radius, to the foot of the excavation. By placing the winding drum in gear, the digging rope is then wound in, and hauling the bucket towards the machine, drags it into the material to be excavated. The thickness of the cut, or the depth to which the bucket is allowed to sink into the material, is regulated by the tension on the hoisting rope. If the depth is correct, the hoisting rope is allowed to unwind freely, or the cut may be made thinner by braking the drum around which it is wound.

Emptying the Bucket

When the bucket is full, the clutch is thrown out of the digging drum, and the hoisting gear engaged. The bucket is then lifted by the hoisting rope and the digging rope allowed to run freely, the bucket thus swinging towards the front of the jib. On the machine being slewed over the dumping point, the bucket is discharged in the manner already described.

When necessary, the bucket may be swung out beyond the radius of the jib head, so as to take a larger radius of cut, by drawing in the bucket on the digging line and allowing it to run out as rapidly as possible, so that it swings beyond the jib head.

The Heaviest Dragline in the World

The illustration at the head of this article, which we print by courtesy of the manufacturers, Messrs. Ruston & Hornsby Ltd., shows the No. 250 Dragline. This is by far the largest excavator ever built in this country. In fact, we believe it is the heaviest of its type ever built by anyone in the world. It weighs 250 tons nett and upwards of 300 tons when fully equipped and in working order. The bucket has a capacity of 8 cubic yards and would nearly fill an 8-ton coal wagon in one cut. The jib is 120 ft. in length and the drag-rope from the bucket $1\frac{3}{4}$ in. in diameter. A cutting power of 30 tons is exerted on the bucket teeth.

The machine's coal bunker has a capacity of 4 tons and is filled by means of a special steam-operated hoist. The main engines are upwards of 400 h.p. and, in addition, separate engines of about 200 h.p. are fitted for slewing the machine.

Designed for India

The cycle of operations is completed in 45 to 55 seconds, including digging, slewing round, discharging, slewing back again and dropping the bucket in readiness for another cut.

The machine is being supplied for work in connection with the Indian irrigation schemes, which, by the way, will be the largest in the world. Some of the channels are to be over 200 ft. in width, and 12 ft. in depth, the excavated material being deposited upon the sides to form banks.

As a crane the machine will lift a load of 22 tons at 125 ft. radius, and although so large and heavy it is very easily controlled by means of steam clutches and steam brakes to all the motions.

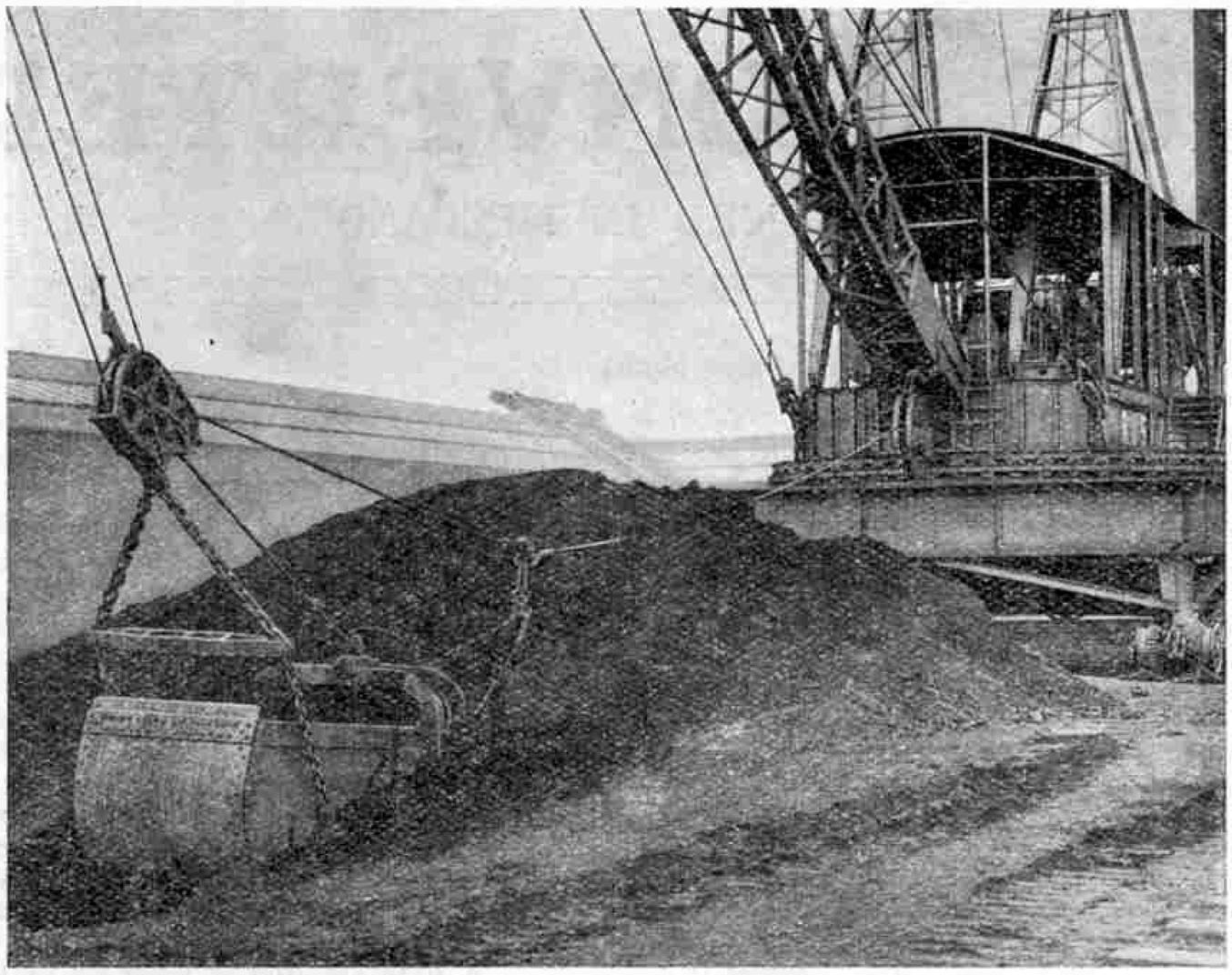
This is the second instalment of an article describing a remarkable machine that will play an important part in the history of engineering. A splendid competition with a cash prize of £5 has been arranged in connection with this article. For full particulars see the concluding paragraph on the next page.

Dragline does Work of 300 Men

For travelling the machine on rails, special swivelling bogies are used, all the wheels being driven. In less than one minute the machine digs 7 to 8 cubic yards of material and deposits it 200 ft. away from the point where the material was taken out. In other words, this great excavator is capable of digging 300 to 400 cubic yards of material in an hour, and will deposit the material over 120 ft. from the centre of the machine, equalling the work of over 300 men.

£5 for Best Model Dragline

The giant Dragline illustrated in these pages forms such an excellent subject for a model that we suggested to Messrs. Ruston & Hornsby Limited, the makers of the original appliance, that they should offer a prize for the best Meccano model of their Dragline. They readily agreed to our suggestion, and we announce, therefore, a special Competition for the best model of this great Dragline, built with Meccano.



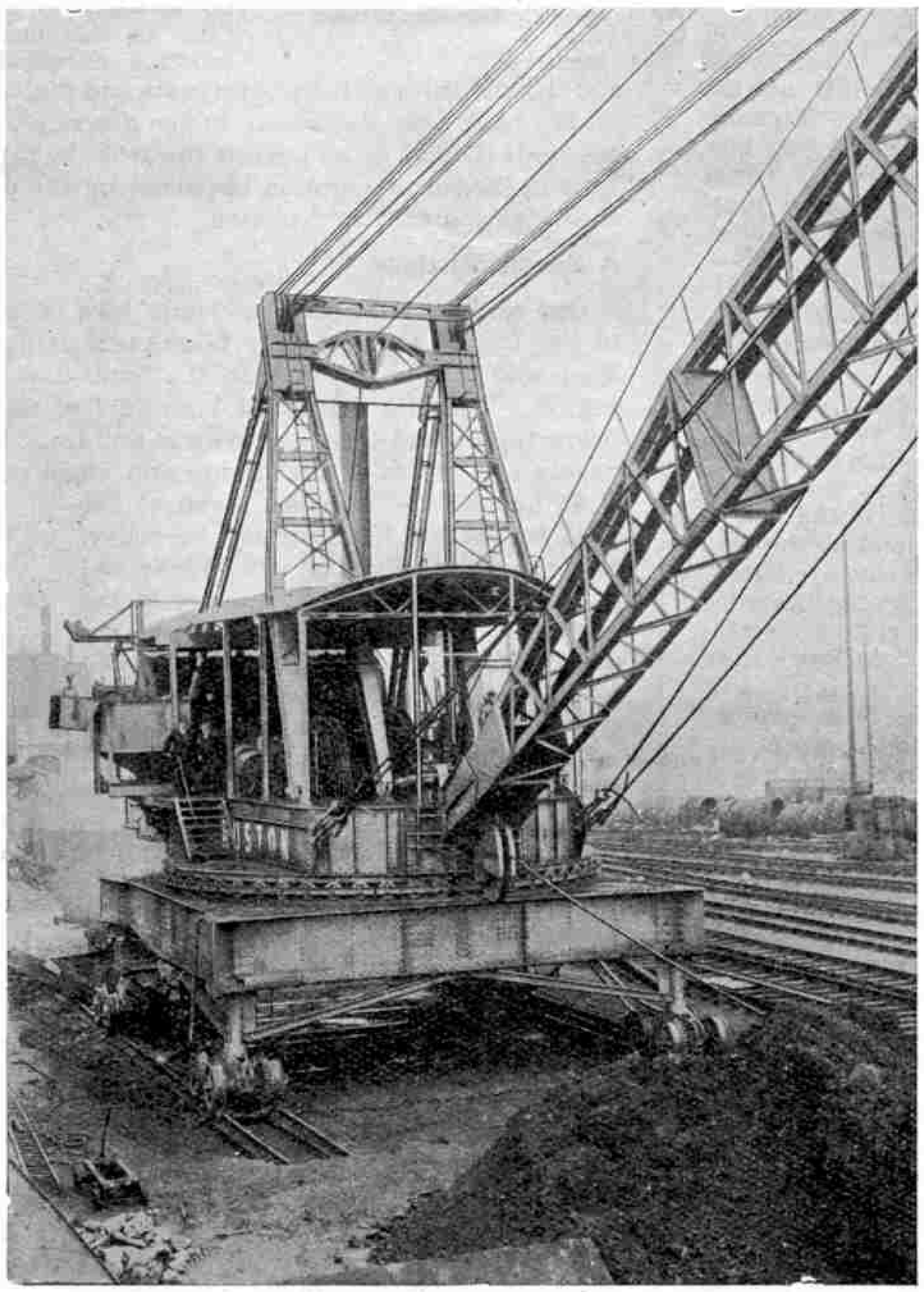
The bucket of a Dragline digs its way into the material to be excavated. It is dragged towards the machine and is emptied by releasing the dragging rope. Its contents are then discharged through the open end

Eight Tons in 45 Seconds—(*cont.*)

The first prize will be a cheque for £5 awarded by Messrs. Ruston & Hornsby Limited. Second and third prizes of Meccano products to the value of £3 3s. 0d. and £2 2s. 0d. respectively, to be chosen by the winner, will be awarded by Messrs. Meccano Limited.

There will be no age limit and any size Meccano Outfit may be used. Entrants should, however, state their age and the number of Outfit used, as this will be taken into consideration in making the awards. The Competition will close on the 30th September next. Actual models should not be submitted, but drawings or photographs should be sent, together with a description of the special features of the model entered, and on these the awards will be made. We shall illustrate a Meccano model of the Dragline, when announcing the results of this Competition in our November issue.

We hope that our readers will set to work and evolve a model worthy of the subject.



A near view of the mechanism that operates the heaviest Dragline in the world

OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

R. Kirkwood (Bath).—We are glad you like the "*M.M.*" so much. Your suggestion that we start a column for animals and domestic pets, is no doubt a good one, but we require all our space at present to do full justice to our already numerous features. Perhaps we shall be able to arrange it a little later.

M. Vaccard (Milan).—We are always pleased to have letters from you in your own language, and there is no need for you to have them translated into English. Your suggestion that we publish several new models each month, one for each Meccano Outfit, makes us gasp a little!

J. Judge (Midsomer Norton).—

"Yes, we have some Meccanos
We've lots of Meccano to-day,
We've long strips and short strips,
And bent strips and flat strips,
And all kinds of strips, I say."

Sorry we cannot find room for all your verses, James, but this one is certainly a good effort. We experienced no difficulty in finding a suitable tune for it! We hope your father will soon be in harness and hard at work again.

T. McKelvie (Auckland, N.Z.).—We have heard of your "little country," as you call it. In fact, it happens to be a country in which we take an intensely keen interest. We know many people who live there; we know it geographically, commercially and ethnologically, and all we know of it is good! We will find a suitable English correspondent for you. Don't wait to be asked to join a Meccano Club—start one yourself and put your back into the work.

L. O'Brien (Johannesburg, S.A.).—We read your letter with much pleasure, and we congratulate you on your school successes. We hope you will enter your new model in our big competition. Write us again.

J. Sears (Watford).—

"There was an old lady of Clewer,
Who rode on a bike and it threw 'er.
A butcher came by
Said 'Missis, don't cry!'
And fastened her on with a skewer!"

A Meccano boy would, of course, have fixed her up in a much more secure fashion with nuts and bolts and strips.

Kenneth Haynes (Maidenhead).—Your suggestions for running a Meccano Field and Nature Club are both interesting and useful. The requests for a Nature Section are numerous, and we are seriously considering the matter.

W. G. Hartley (Birchington).—

"Life is mostly froth and bubble;
Two things stand like stone—
Building models with Meccano,
Letting work alone."

We were much impressed with your poetry, Walter, until we came to the last line, which made us elevate our eyebrows a little. Perhaps some of our readers can think of a better line to replace the offending one. We will give half-a-crown for the best effort.

E. V. Corps (Northampton).—First let us congratulate you on your success in your Chemistry exam. Your suggestion for a "Readers' Own Corner" in which letters from Meccano boys would be the principal feature is good, and we may adopt it later. We note you liked the tongue-twisters in our Xmas number, and shall give some more of these in a future number. We agree that a man in the condition you name might have some difficulty in saying "Agricultural statistics!"

G. H. B. Stafford (Pitsmoor).—We are pleased to receive your first letter, although, as you have been a keen Meccano boy for eight years, you really should have written to us long ago! You are both wise and fortunate in having so many enjoyable hobbies. We have read with interest the programmes of the two organ recitals which you have given at your church, and are glad to have a copy of the music which you have composed.

H. Hurdle (Hornsey).—We are writing to you separately about the nearest Meccano Clubs, and we hope you will have joined one of them by this time. Thanks for your suggestion that we provide Meccano flags for decorating models; this we may consider later.

THE TORQUE CONVERTER

REMARKABLE INVENTION REPRODUCED IN MECCANO

IT has always been claimed for Meccano that any movement known in mechanics may be reproduced in model form. A striking vindication of this claim is furnished by the model of the Constantinesco Torque Converter. This model clearly demonstrates the working principle of this new device, which, incidentally, is stated to be based on principles understood only by those having a knowledge of advanced mechanics and mathematics. The fact that it is possible to reproduce in Meccano so highly technical a piece of apparatus is in itself a striking tribute to the Meccano system.

An Invention of Promise

The Torque Converter created a considerable sensation in engineering circles a short time ago and was briefly described in our February issue, in our interview with Mr. George Constantinesco, the inventor. We believe that there is a great future before this remarkable invention, and for some time past our model-building department has been at work endeavouring to evolve a model of the Converter in Meccano. After some considerable experiment we have succeeded in perfecting a model that, although not built on the same lines as the actual Constantinesco Converter, admirably fulfils the purpose of demonstrating the remarkable principle on which the original Converter is based.

This model will be of general interest to readers of the "*M.M.*" More especially will it interest those who are contemplating building the model of the Meccano Chassis, and who are desirous of eliminating the standard gear-box and clutch and incorporating the latest invention instead. Those of our readers who have already constructed the Chassis may build the Torque Converter into their existing model without difficulty.

Motor Cars Without Gears

We may here explain that there are two main ideas behind the Constantinesco invention. One is that it makes possible the construction of motor cars without clutches or gears, and the other that it fulfils the purpose of an infinitely variable gear that automatically adjusts itself to the conditions imposed by the nature of the gradient on which the car is travelling and by the load on the car. Cars fitted with the device are therefore controlled simply by the throttle, which governs the engine speed. The inventor recently declared that he believes his Torque Converter will revolutionise all forms of transport, for it is not confined to the motor car alone, but may be applied with equal success to locomotives, aeroplanes, ploughs, tractors and indeed all similar forms of vehicles.

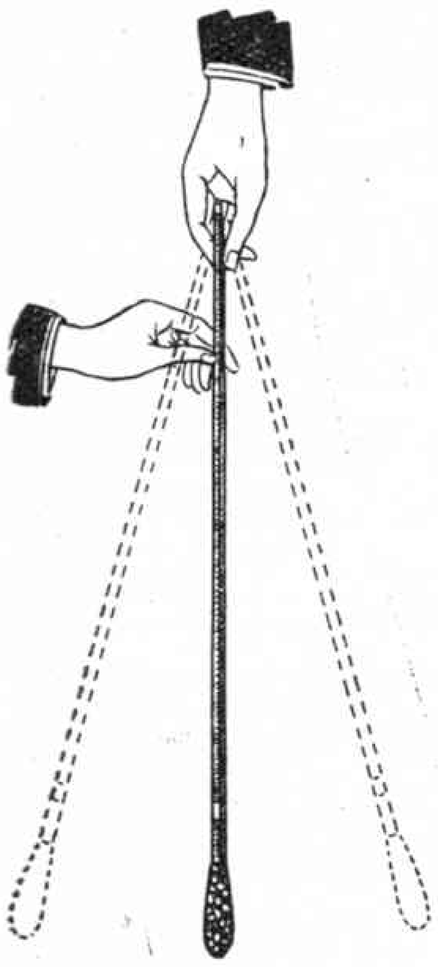


Fig. 2

One of the great advantages of such an invention is that vehicles will require engines of only about half the size of the engines used to-day. Not only will an economy in petrol and oil consumption be effected, but the complicated mechanism of engines with four, six, or eight cylinders will be eliminated and the costly material, machinery and labour used in their manufacture will no longer be necessary. In future an engine with a single cylinder, and perhaps a cheap two-cycle engine, may be sufficient to drive almost any vehicle.

Principle of Our Model

In an interview, Mr. Constantinesco informed us that without falling back on advanced mathematics and highly technical engineering knowledge it was impossible for him to explain how he obtained his results in such a manner that the non-technical reader could understand. If the inventor himself found it impossible to give this information, our readers will realise that we are confronted by a task of some difficulty in ourselves endeavouring to explain the principle of the Torque Converter! We propose, therefore, to simplify matters by confining our explanation to the working of the Meccano model of the Converter. We wish, however, to again emphasise the fact that this model is not a replica of the actual device—it is a model by which the working principle of the Converter is demonstrated.

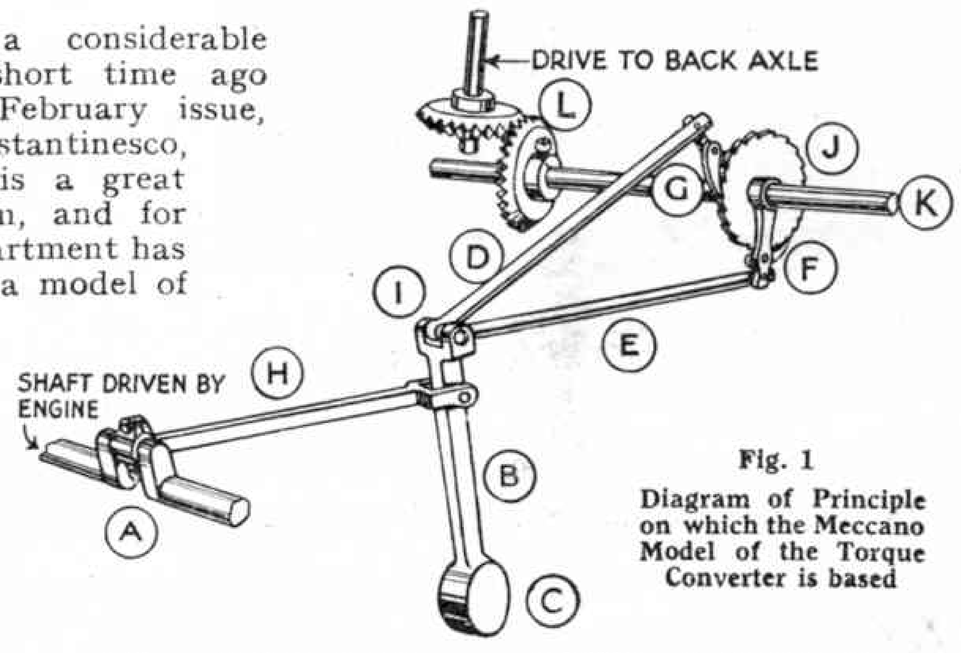


Fig. 1
Diagram of Principle on which the Meccano Model of the Torque Converter is based

A diagram of the working of the model is given in Fig. 1. The crank (A) driven by the engine, is connected to a lever (B), to the lower end of which is fixed a heavy weight (C) forming a pendulum. The other end of the lever (B) is connected to two rods (D and E) carrying pawls (F and G) which bear on a ratchet wheel (J). In this manner the torque, or twisting effect, is delivered to the rod (K) and through it by bevel gears and shaft (L) to the differential on the back axle (not shown in the diagram). No matter whether the rods (D and E) be pushed towards the ratchet or pulled away from it, the turning motion imparted by the pawls to the rod (K) is always constant in direction.

A Simple Analogy

Our readers will obtain a clearer idea of the working principle of the Torque Converter by taking a walking stick with a heavy knob and suspending it with the knob downwards, as shown in Fig. 2. With the left hand take hold of the stick a few inches below the tip and swing it gently to and fro. Notice that it swings evenly and pivots in the thumb and finger of the right hand.

As long as the impulses given to the stick by the left hand are not excessive, the swinging of the stick will be easy and pendulum-like. If the frequency of the impulses be increased, however, a different state is set up, as is evidenced by an increase in pressure conveyed to the right hand acting as a pivot for the stick. As the impulses increase in frequency, a change in equilibrium takes place. Instead of the stick tending to pivot between the finger and thumb of the right hand, the pivot shifts down the stick, until at last—given a sufficiently high frequency—it moves to the opposite end of the stick and the heavy knob at the end of the stick becomes the pivotal point, while the pendulum-like movements are now carried out by the hand in which the stick originally pivoted.

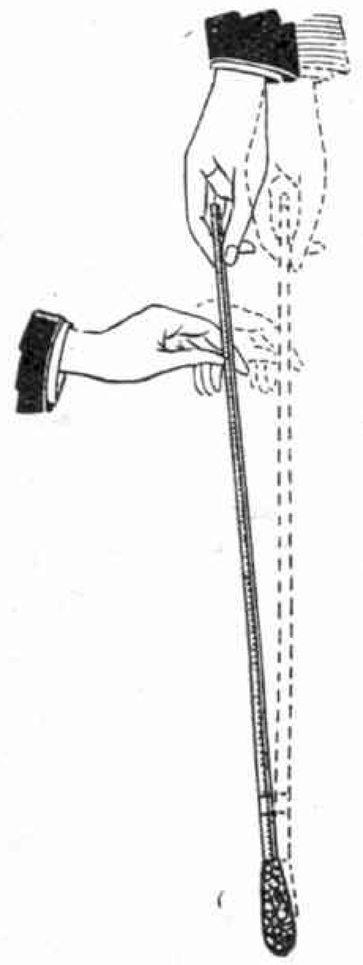


Fig. 3

An Irresistible Force

This change is made manifest in a remarkable manner to the person holding the stick. As the impulses increase in intensity, the hand holding the tip of the stick finds itself compelled to yield to an irresistible increasing pressure. It

is moved backwards and forwards by a powerful superior force, oscillating this way and that, with a degree that depends entirely on the frequency of the impulses received by the stick.

The original conditions have thus become entirely reversed. Instead of the knob oscillating to and fro and the right hand remaining at rest, with the tip of the stick pivoting in the finger and thumb, the knob ceases to oscillate and becomes the point on which both stick and supporting hand now pivot. The oscillations originally performed by the knob are transferred to the other end of the stick and are now performed by the right hand. Expressed in engineering language, it would be said that the fulcrum has receded.

It is important to realise that the pivotal point does not change suddenly from the tip of the stick to the knob, but moves slowly from one to the other, according to the frequency of the impulses received by the stick. If these are not sufficient the fulcrum may never reach the knob. If the frequency varies, the position of the fulcrum will vary also every instant, its location alternating momentarily between the tip and the knob. If the oscillations decrease in intensity beyond a certain point, the pivotal point returns to the tip and the original order of things is restored.

This is the principle on which the Constantinesco Torque Converter is based, and the Meccano model works on the same principle. In it the hand moving the stick is replaced by the connecting rod (H Fig. 1) coupled to a crank (A). The place of the hand forming the pivot is taken by the bolt (I) which carries the rods (D and E) in our diagram. Impulses from the crank are transferred to the pawls (F and G), which in turn pass on the impulses—now converted into a turning movement—to the driving shaft.

"How It Works"

When the engine is running slowly only a slight swinging movement is given to the lever carrying the weight, which movement is not sufficient to move the pawls on the gear wheels. As the speed of the engine increases, however, the weight is compelled to swing faster and faster, imposing an increasingly heavy force or load upon the pawls. At length this load becomes so great that the resistance of the back axle is overcome; the pawls move the gear wheel and the driving shaft, and the car moves slowly forward, to gather speed subsequently.

The conditions of our analogy in Fig. 2 are simulated when the weight (C Fig. 1) swings without imparting any movement to the shaft, through the ratchets. On the other hand, when the engine is running rapidly the fulcrum recedes and the weight (C) becomes the pivot, as it cannot respond to the rapidly-repeated impulses of the rod (H) with sufficient rapidity.

The condition illustrated in Fig. 3 arises when the resistance caused by starting up the car is overcome, and when the lever pivots on the weight (C). In these circumstances the drive from the engine is practically a direct drive to the back axle.

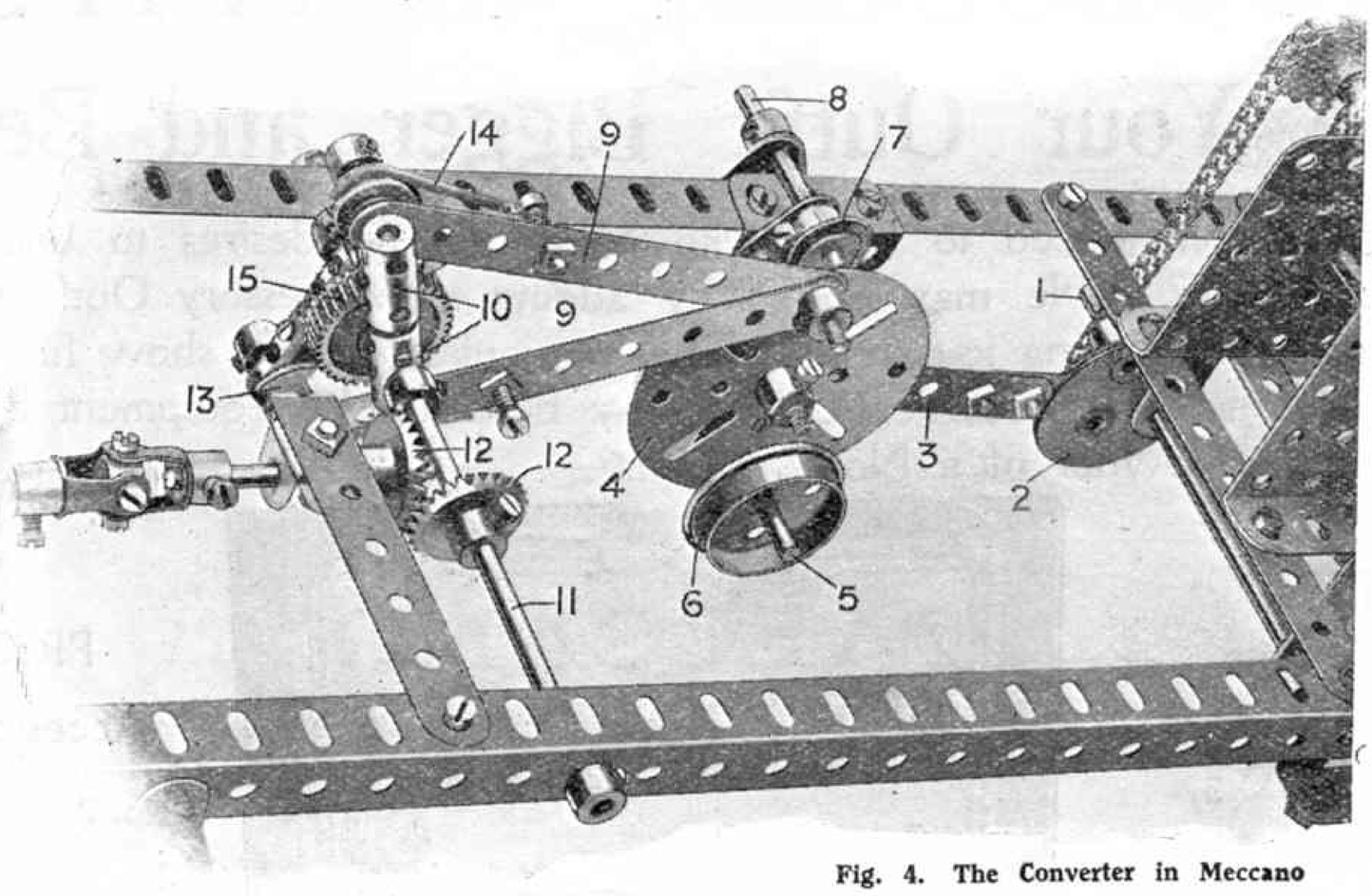


Fig. 4. The Converter in Meccano

Building the Meccano Model

The Meccano model of the Torque Converter may be constructed as follows. The rod 1 (Fig. 4) is rotated by a sprocket chain from the electric motor fitted to the chassis. This rod carries a triple throw eccentric (2) which is connected by a 3" strip (3) to the centre of a face plate (4). A short rod (5) passes through the lower hole of the face plate and carries two flanged wheels (6) which act as the pendulum weight. The rod (5) and the weights (6) are suspended by two cranks (7) from the short pivotal rod (8) mounted on the main member of the frame as shown. Two 4½" strips (9) are connected to the top hole of the face plate (4) and their other ends are connected to elements each formed by two couplings (10) secured on short rods, the couplings rocking loosely on the driven rod (11) from which the drive to the differential is conveyed through the bevels (12). Two pawls (13) are mounted on short rods secured in the outer holes of the coupling (shown more clearly in Fig. 5), these pawls, being controlled by short tension springs (14) so that they are kept in contact with a 1" gear wheel (15). When moving in one direction they trail idly over this gear wheel, but when moving in the other direction, they drive the gear wheel (15) and consequently the rod (11) to which the wheel is secured.

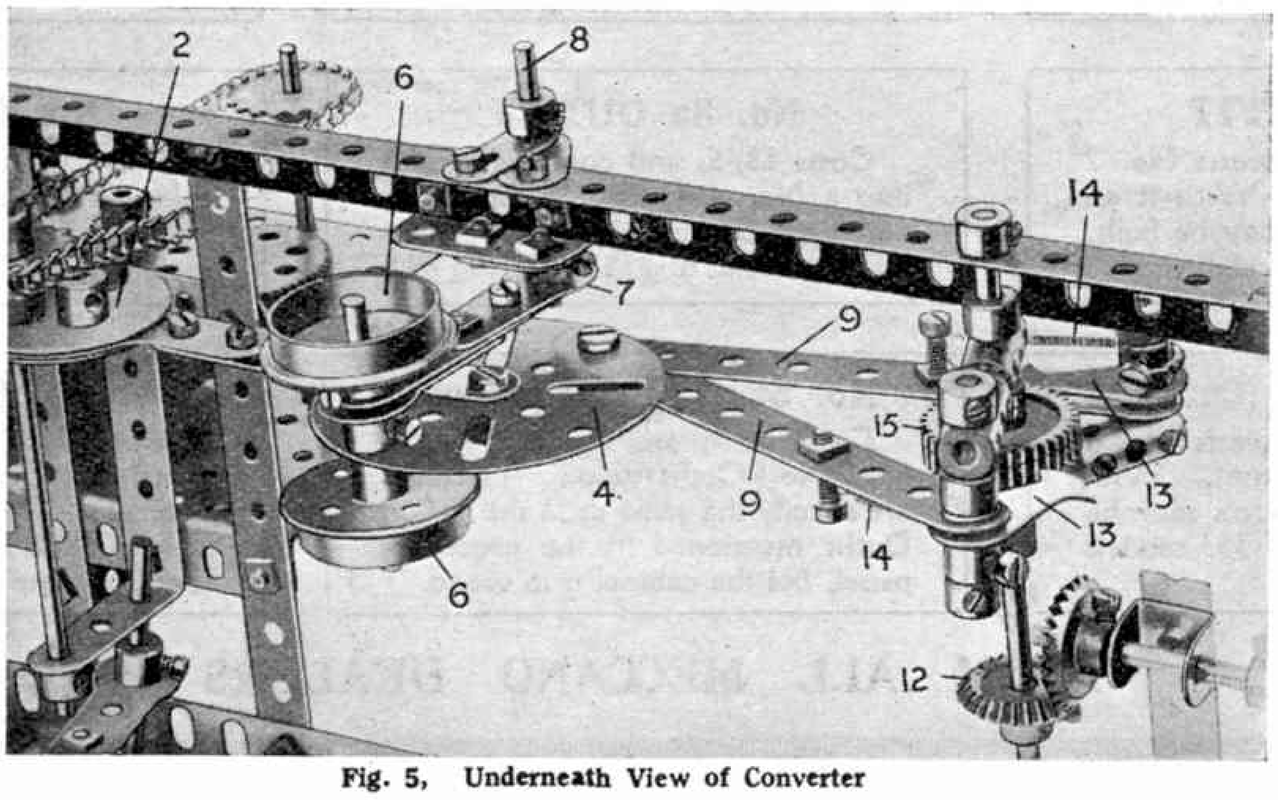


Fig. 5, Underneath View of Converter

Theory and Operation of the Model

Technically, the theory of the mechanism is as follows:—When the motor is running slowly the pendulum tends to oscillate about the rod (8) and little, if any, movement is imparted to the pawls; this corresponds to a low power. Should the resistance to movement in the rear axle be great, however, the fulcrum recedes towards the weight (5). Owing to the inertia or reluctance to vibrate quickly the face plate then pivots about the weight and a greater force is exerted on the strips (9) to drive the shaft (10). In this way the gear accommodates itself automatically to the work to be done.

In operation the rod (1) is rotated by the motor, the eccentric (2) tends to drive the strips (9) to and fro as the weight oscillates. This to and fro movement of the strips (9) results in a corresponding movement of the pawls. As the pawls are mounted to lie in opposite directions round the gear wheel (15) the latter is driven in one constant direction in a series of pulsations.

Remarkable Power Obtained

An interesting detail is the remarkable increase in power obtainable even from so small a form of Converter as that adopted in the Meccano model. This is demonstrated by jacking up the rear axle to allow the driving wheels to freely rotate, when it has been found impossible to prevent the revolution of the driving shaft when gripped with the finger and thumb below the universal joint. When it is remembered that the driving force is obtained only from a small electric motor, driven by a 4-volt accumulator, the remarkable power imparted by the Torque Converter becomes apparent. By holding the shaft with greater or less degree of pressure the Converter may be made to demonstrate its automatic adjustment to a varying load or resistance in a remarkably effective manner.

Automatic "Gear" Adjustment

The automatic adjustment of the gear to the load and to the gradient is one of the most interesting

(*Continued on page* 107)

MECCANO
ACCESSORY OUTFITS
Make Your Outfit Bigger and Better

Once a boy has commenced to build with Meccano, he desires to build larger and more ambitious models. He may do so by adding an Accessory Outfit to his existing set, thereby greatly increasing its scope. The particulars below show how a boy who commences with one of the earlier Outfits may build up his equipment by easy stages, until he is the proud owner of a No. 7 Outfit.

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No. 00	... ...	**3/6**
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PRICE LIST
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No. 00a	... ...	**1/6**
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No. 1a	... ...	**7/6**
No. 2a	... ...	**8/6**
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No. 5a	(carton) ...	**50/-**
No. 5a	(wood) ...	**80/-**
No. 6a	... ...	**210/-**

This illustration shows a No. 3a Outfit which converts a No. 3 into a No. 4 Outfit.

No. 00a OUTFIT
Costs 1/6, and converts No. 00 into a No. 0 Outfit. With it an additional 27 models may be built, making a total of 70 models in all.

No. 0a OUTFIT
Costs 4/-, and converts No. 0 into a No. 1 Outfit. With it an additional 36 models may be built, making a total of 106 models in all.

No. 1a OUTFIT
Costs 7/6, and converts No. 1 into a No. 2 Outfit. With it an additional 57 models may be built, making a total of 163 models in all.

No. 2a OUTFIT
Costs 8/6, and converts No. 2 into a No. 3 Outfit. With it an additional 43 models may be built, making a total of 206 models in all.

No. 3a OUTFIT
Costs 18/6, and converts No. 3 into a No. 4 Outfit. With it an additional 53 models may be built, making a total of 259 models in all.

No. 4a OUTFIT
Costs 15/-, and converts No. 4 into a No. 5 Outfit (carton). With it an additional 43 models may be built, making a total of 302 models in all.

No. 5a OUTFIT (Carton)
Costs 50/-, and converts No. 5 into a No. 6 Outfit (carton). With it an additional 51 models may be built, making a total of 353 models in all.

No. 5a OUTFIT (Wood)
Costs 80/-, and converts No. 5 into a No. 6 Outfit (wood). The parts are exactly the same as in the carton Outfit mentioned in the preceding panel, but the cabinet is in wood.

No. 6a OUTFIT
Costs 210/-, and converts No. 6 Outfit into a No. 7 Outfit (oak cabinet). This Outfit builds every one of the 393 models illustrated in the Complete Manual.

FROM ALL MECCANO DEALERS



Into the Land of Fun

by

"SPANNER"



New Meccano Parts and their Uses

HOW many times, when building some new model, have we not all said, "If only we had a curved brace girder"—or perhaps it was a corner brace, or some special kind of strip or flat plate that we required at that particular moment. There must be hundreds of Meccano boys who say "If we only had a . . . " every day, although they do not all send their suggestions to the "Bright Ideas" column for consideration.



No. 119. Large Wheel Segment

Nevertheless, the suggestions received for additions to the Meccano system are very numerous indeed. Last year, when visiting the Meccano factory, I was told that the model-building staff spend many hours every day "trying out" these "Bright Ideas." Some seem very promising on paper, but when they are put into practice, their short-comings are at once apparent. If these difficulties cannot be overcome, the idea has to be discarded.

Two of the chief characteristics of the Meccano system are its standardisation and its great adaptability. These have been arrived at only by the possibility of being able to use almost every part for a variety of different purposes. Many ideas have to be turned down because the parts suggested serve only a single purpose, and they cannot therefore be given a place in a system, the key-note of which is "adaptability."



No. 137 Wheel Flange

Then again some "Bright Ideas" for new parts are not practicable from a manufacturing point of view, although the parts themselves would no doubt add to the usefulness of the system. A suggestion may be for a new part that, if made, could only be sold at £1 or more—so here again the "Bright Idea" cannot be proceeded with, on commercial grounds alone.

In addition to the above, however, there is one other reason why many "Bright Ideas" are not proceeded with, and this concerns by far the greater number of new parts suggested. These are not made use of because of the fact that parts already exist in the Meccano system that make quite satisfactory substitutes. As an example of this, I hear that very many requests have been received for a flanged wheel of 2½" diameter. Now a wheel of this diameter may easily be made by attaching a Flanged Disc to a Face Plate. Thus it would obviously be a waste of material to manufacture a special 2½" Flanged Wheel and include it in the system.



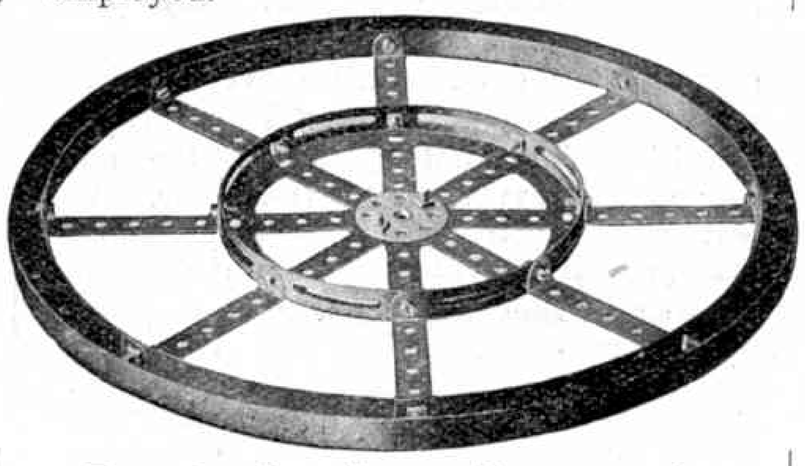
No. 140 Universal Coupling

When chatting with Mr. Hornby on the subject of "Bright Ideas," I was very impressed to learn that every suggestion received is considered by the model-building staff. My readers will gain some idea of what this means when it is learned that tens of thousands of "Bright Ideas" from all over the world are received at the Meccano Offices in the course of a year! Some of the ideas submitted do prove really practical and useful, and wherever possible these are invariably adopted. The inventors, enthusiastic Meccano boys themselves, have the satisfaction of knowing that they have materially contributed to the enjoyment and success of thousands of model builders all over the world.



No. 19c. Pulley Wheel

Some of the more recent new parts are illustrated on this page, and as their uses may not yet be familiar to all my readers, I intend to describe how each may be employed.



Example of how the new Meccano parts, Nos. 118 and 119, may be used together

First of all, No. 19c, the 6" Pulley Wheel, was illustrated in the February Magazine, and is a part that has long been needed. It is the largest of its kind made, and has a boss and set-screw with which it may be secured to an axle rod. This part is invaluable in models where a smaller sized pulley is unsuitable. Two of its most useful applications that occur to me are as a reduction or step-up drive, and, when used in conjunction with the Large Wheel Hub, as a large ball race.

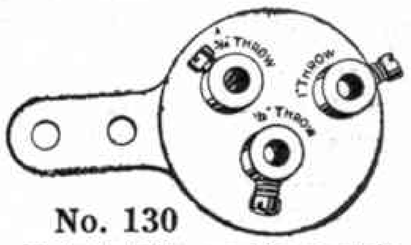
No. 118, Large Wheel Hub, is made in one size only, namely, 5½" in diameter. It may be used for various purposes, such as, for example, a small fly-wheel. The equidistant holes in the spokes and outer rim make it possible to build it into a model, and so use it in many ways. By attaching Rack Segments to it, it may be used as a base for rotating cranes, etc. When used in conjunction with part No. 119, the Large Wheel Segment, an 11½" diameter wheel may be constructed, as illustrated on this page. Eight Wheel Segments are required to form the wheel rim, and, with the Wheel Hub as a centre, 2½" × ½" Double Angle Strips radiate to the outer circumference. The large wheel thus obtained may be used in several models, such as a large fly-wheel in the Beam Engine. The Large Wheel Segment may also be used for forming a wheel race, used in the base of large Cranes, Excavators, etc.

I think that No. 130, Triple-Throw Eccentric, is one of the most useful of all Meccano parts. Its use is illustrated in several models in the Manuals. One of its many applications was given last month in the description of the model Cake-Walk. The Triple-Throw Eccentric embodies a very ingenious and thoroughly sound mechanical principle, and is chiefly used to convert a circular motion into a to-and-fro or up-and-down movement, as in the Cake-Walk model already mentioned. Three different degrees of throw are obtainable (i.e., 1", ¾" and ½") by altering the position of the rod in the boss and set-screw, according to the degree required.



No. 134. Crank Shaft

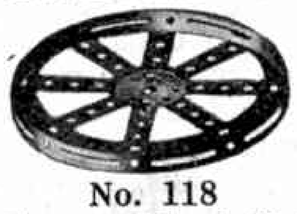
No. 134, Crank Shaft, in the system has a 1" stroke, and was introduced last year to fill an insistent demand. Now-a-days we can scarcely imagine the Meccano system without a Crank Shaft, and we wonder how we overcame the difficulty before this part was added to the system. It has a variety of uses, which are too obvious to need description. Last time I visited the Meccano factory I saw that the model-building department were busy experimenting with a new form of crank—a double crank, in fact, with a special coupling for a big-end connection. This part has not yet been adopted, but may be introduced at some future date.



No. 130 Triple-Throw Eccentric

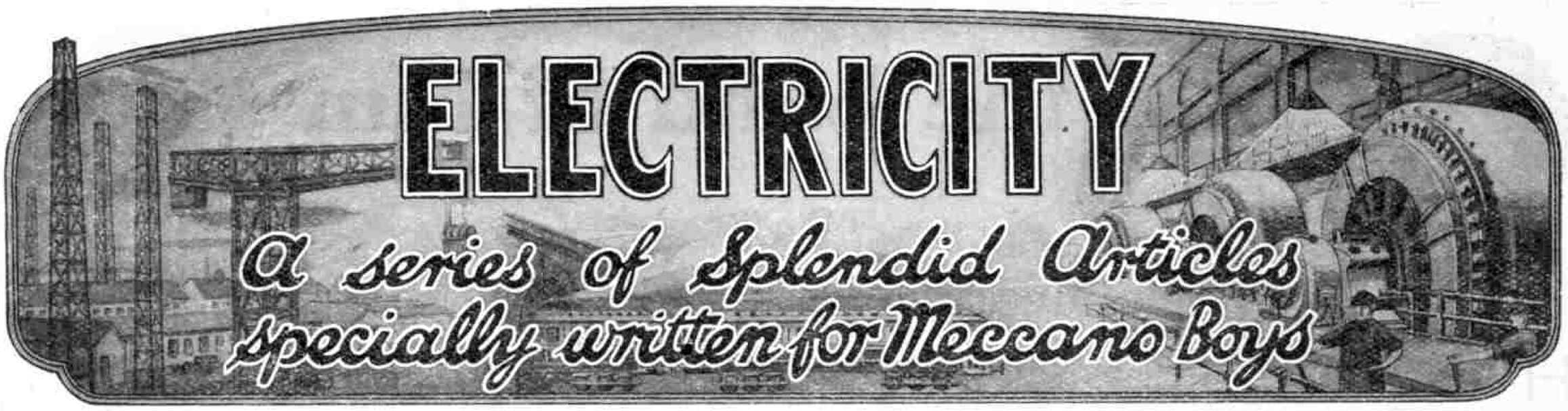
No. 137, Wheel Flange, is particularly useful in making the "race" for ball bearings, as described in the February "*M.M.*" It is fitted inside a 3" pulley wheel, and both are mounted on a common axle, the balls being placed between the two flanges. When used in conjunction with a Face Plate, the Wheel Flange gives a Flanged Wheel of 2½" diameter.

In a recent number of the "*M.M.*" full instructions for building the Meccano Motor Chassis were given. In the original model, some ingenuity had to be exercised in making a universal joint (to connect the gear box and cardan-



No. 118 Large Wheel Hub

(*Continued on page* 103)



II. FURTHER EXPERIMENTS WITH STATIC ELECTRICITY

IN our article last month we showed how a glass rod that is electrically charged (by rubbing it with a silk handkerchief or piece of flannel) attracts or repels pith balls. We mentioned also that electricity is of two kinds, "negative" and "positive," and that the kind of electricity with which a glass rod becomes charged depends upon the material used for rubbing it. Glass rubbed with silk takes a positive charge; sealing-wax rubbed with flannel takes a negative charge.

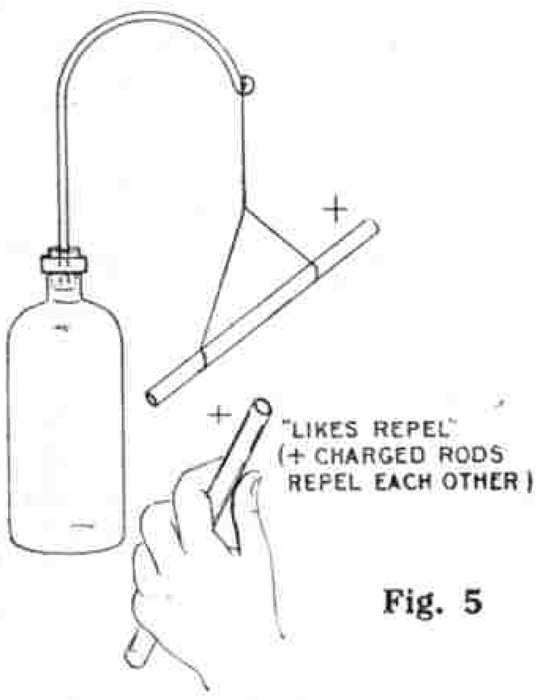


Fig. 5

We may demonstrate this more clearly by suspending a glass rod in place of the pith ball. This may be done by arranging two loops of silk thread, or by hanging a stirrup of wire by a silk thread from our support. Before suspending the rod in this manner we first electrify it by rubbing briskly with a piece of flannel. Then, by slipping it through the loops, we leave it hanging in a charged state. We then charge another glass rod in a similar manner, and on holding it near the suspended rod we find that the latter is repelled by it (Fig. 5). On the other hand, if the rod we hold is charged by rubbing it with a silk handkerchief, we find that it does not repel the hanging glass rod, but attracts it (Fig. 6). When performing this experiment remember that the hanging rod should be recharged, if the other rod touches it at any time.

Curious Behaviour of Pith Balls

The same experiment may be repeated with two pieces of sealing-wax, in place of the glass rods, rubbing them with a silk handkerchief, a piece of fur, or with flannel. Many other interesting experiments on similar lines may be devised. For instance, having observed the effect on the pith balls, first of the glass rod and then of the sealing wax, we may learn what happens when the glass and sealing-wax are used together. Having first presented the sealing-wax—excited with flannel—to the balls, rub the glass rod with the silk handkerchief and hold it near to the balls. They will at once be attracted by it, although they had been previously repelled by the sealing-wax. Allow the glass rod to touch them until they become fully charged and they will then be repelled by it. On presenting the excited sealing-wax to them again, however, they will now be attracted by it.

Electricity, the greatest force in the Universe, is a good servant but a bad master. When imprisoned and under control it serves man, giving light and power. Unfettered—as in the lightning flash—it may do great damage, setting fire to a warehouse or wrecking a building.

Attraction and Repulsion

Another extension of the original experiment may be performed by using two pairs of pith balls, suspending them by silk threads from separate supports. Hang each pair some distance apart and, rubbing the glass rod with the silk handkerchief, electrify one pair. Now rub the sealing wax and electrify the other pair, having done which move the two pairs near each other. A surprising condition immediately arises, for one pair will be attracted by the other. All trace of electrification will promptly disappear if they are allowed to touch.

From these experiments we prove to our own satisfaction that there are two kinds of static electricity, as Dufay discovered. We also see that unelectrified bodies are strongly attracted by either kind of electricity, whether + or —. At the same time we learn that two bodies charged with the same kind of electricity, no matter whether positive or negative, repel each other. Having thus mastered the meaning of positive and negative electricity, we shall have less difficulty in understanding and making other experiments of a more advanced nature, later on.

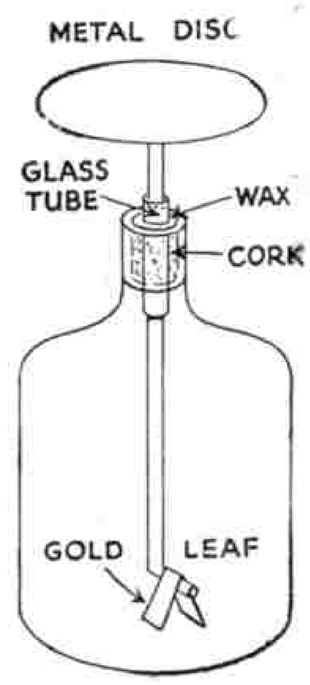


Fig. 7

A Simple Electroscope

Electrified Paper

We may generate static electricity by several methods other than by rubbing with silk or flannel. For example, a piece of writing paper warmed before the fire, laid on a wooden table, and rubbed briskly with a dry hand adheres to the table (Fig. 8).

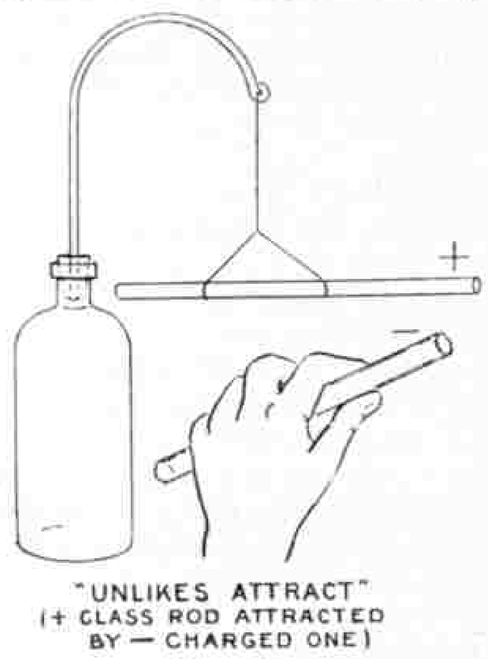


Fig. 6

Ordinarily the paper is easily moved about on the surface of the table, but after being rubbed it is difficult to move. If one corner be lifted, the paper will curl up and will cling to the hands or clothing. If held to the face a tickling sensation is experienced.

Those of my readers who are photographers will, perhaps, have experienced a similar phenomenon when drying their prints. In order to obtain a high glaze, photographic prints are pressed with a rubber roller (known as a "squegee") on to a metal plate. After having been dried by the fire the corners of the prints are lifted and the dried prints peel off the plates. Often they will be found to be electrically charged and adhere to the plate, to the hand of the photographer, or to any portion of his clothing on which they may be placed. If they are lifted to the face there is a tickling sensation as though a very feeble electric current is passing.

All these phenomena are due to the fact that in each case the paper is electrified with a charge of static electricity. In obedience to the law mentioned in our last instalment ("unlikes attract") the paper adheres to other objects because they are not electrically charged.

Constructing an Electroscope

The presence of a charge of electricity is demonstrated by an electroscope, a simple form of which may be made as indicated in our illustration (Fig. 9). This consists of a fold of paper balanced on the point of a needle, the head of which is embedded in a cork.

Take "Snaps" like this!



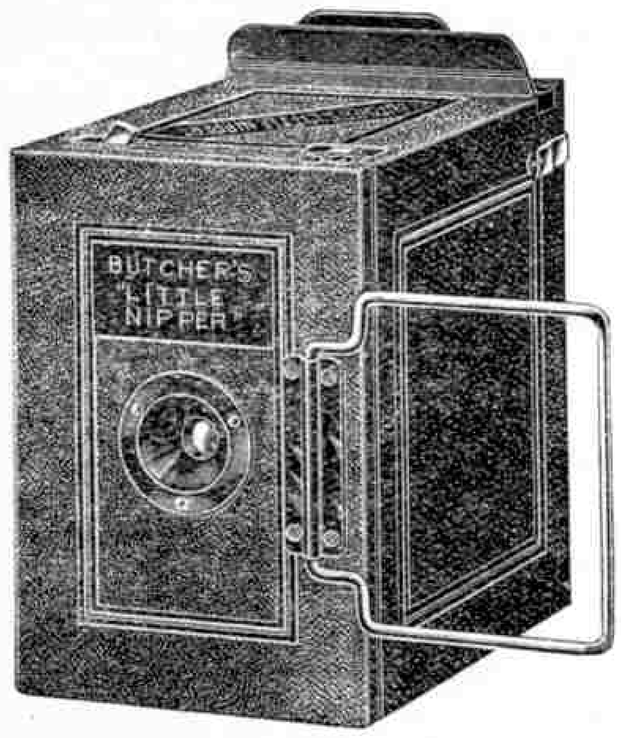
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Electricity—(*cont.*)

Actually this simple electroscope is a kind of paper compass, and it will move around when the charged glass rod is brought near it, just as a compass needle will move when a bar-magnet is brought near it.

Another form of electroscope, which is sensitive to less powerful electrical charges, may be made from gold-leaf, which may be obtained from a picture-framer or artist's colourman. If gold-leaf cannot be obtained, very fine tissue paper will serve the purpose, but is not so sensitive. First obtain a glass jar with a wide neck, and then hang the strips of gold-leaf from a piece of wire passed through the neck of the bottle. The gold leaf is suspended by bending the lower end of the wire at right-angles as shown in our illustration (Fig. 7). The bottle is closed by a cork through the centre of which a narrow glass tube passes. The glass tube is used to completely insulate the wire and an additional precaution may be taken by coating the cork with wax to insulate it more completely from the bottle. A metal disc of two or three inches in diameter is soldered to the upper end of the copper wire and the electroscope is ready for work.



Fig. 8. Experiment with Paper

If we bring an electrified glass rod to the metal disc of the electroscope we find that the strips of gold-leaf repel each other in a marked degree. If the electroscope has been well made, the gold-leaf will begin to separate even whilst the charged rod is some distance from the disc. The gold-leaf electroscope is one of the most sensitive means of detecting small charges of electricity and has been used in most of the important electrical experiments by leading scientists. This form of electroscope may be made so sensitive that the strips may be caused to diverge simply by the electrical charges generated in the chips formed by sharpening a pencil.

A Surprise for the Cat

Summer is not the best time for performing experiments with static electricity. These are more successful when the air is cool and clear. In summer the atmosphere contains a large proportion of moisture, and this conducts the electricity away from the apparatus almost as quickly as it is produced.

An interesting experiment in static electricity may be performed with your cat on a cold, dry day in winter. Choose a time when the cat is near a fire and stroke it rapidly with the hand. If you listen carefully you will notice a faint crackling noise as your hand passes over the cat's fur. If you perform this experiment in a dark room you will be able to see small sparks passing between your hand and the cat, and it is these sparks that cause the crackling noise. After you have been stroking the cat for a short time, place your knuckle near the cat's nose. A spark will then jump from the cat to your knuckle (Fig. 10), much to the surprise of the cat, who will probably not be at all pleased with your experiment! The experiment is an interesting one, but we hope that—for the cat's sake at any rate—our readers will not perform it on more than one occasion, even if they are able to persuade pussy to come along and oblige them a second time!

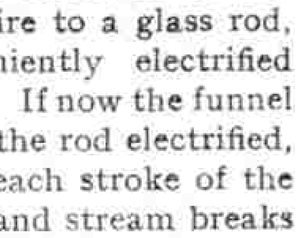


Fig. 9

Electrified Sand

Before concluding this article we may mention another exceedingly interesting experiment, which illustrates the mutual repulsion of bodies charged with the same kind of electricity. If we pour fine, dry sand into a funnel, the sand runs through the funnel in a steady narrow stream. Now let us connect the reservoir of the funnel by means of a wire to a glass rod, which may be conveniently electrified by rubbing with flannel. If now the funnel be filled with sand, and the rod electrified, it will be seen that, at each stroke of the flannel on the rod, the sand stream breaks and the particles fall, not in a narrow stream, but in a wide one, something like an open umbrella in shape. The explanation of this is that the tiny particles of sand, all being charged with the same kind of electricity, repel one another, and in their efforts to get away from one another they spread out into a wide stream.

NEXT MONTH

In our next issue we shall tell how Franklin brought an electric current from the sky to earth by means of a kite. We shall also describe an interesting experiment called "the jumping frogs."

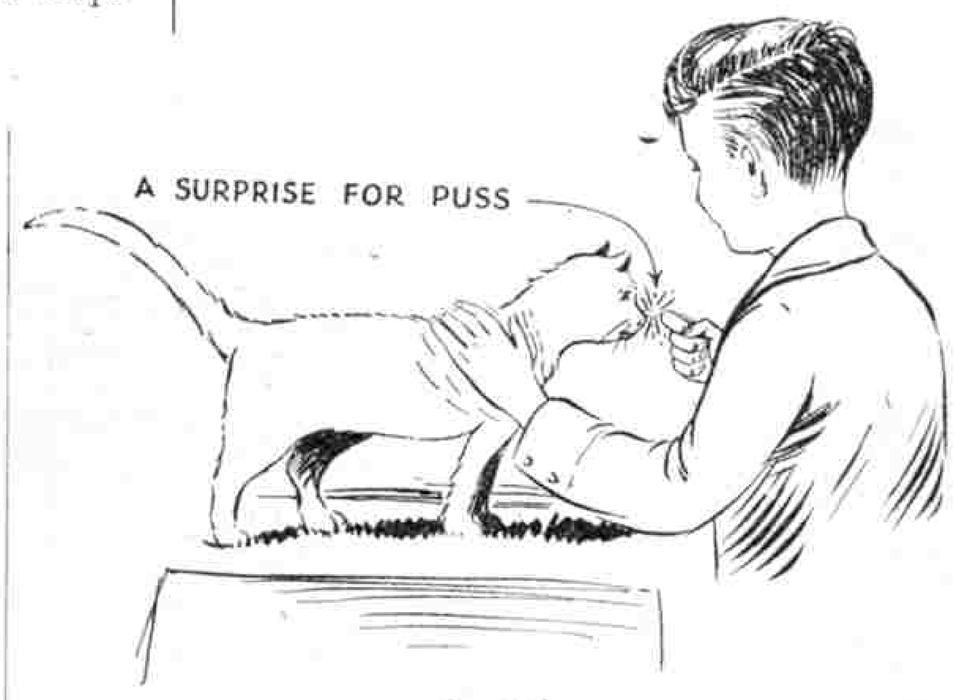
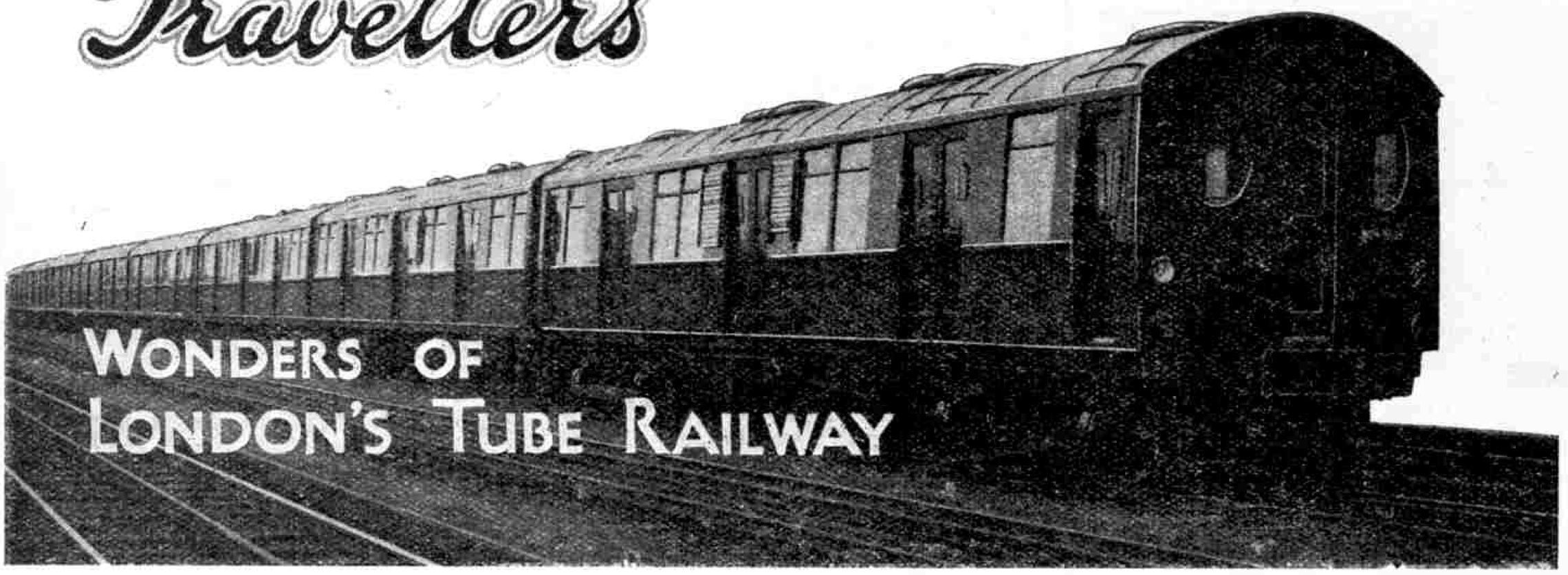


Fig. 10
Making a spark between the cat and your knuckle

Millions of Underground Travellers



WHEN a boy, one of my greatest ambitions was to visit London, and I suppose that a large number of my readers are filled with a similar ambition—except those who live in or near London and to whom a visit to the great City is no novelty.

London has a long list of interesting objects and wonderful sights that attract all visitors. Westminster Abbey, the Zoo, Kew Gardens, the British Museum, and the Horse Guards, the National Gallery, the Tower, Greenwich Observatory, and hundreds of other wonders too numerous to mention, make their appeal.

In visiting these objects of interest widely scattered over a large area, the visitor is certain to use the Underground Railways. A journey on the Underground is most interesting, and as there are very few such railways in existence the experience may be called an unusual one.

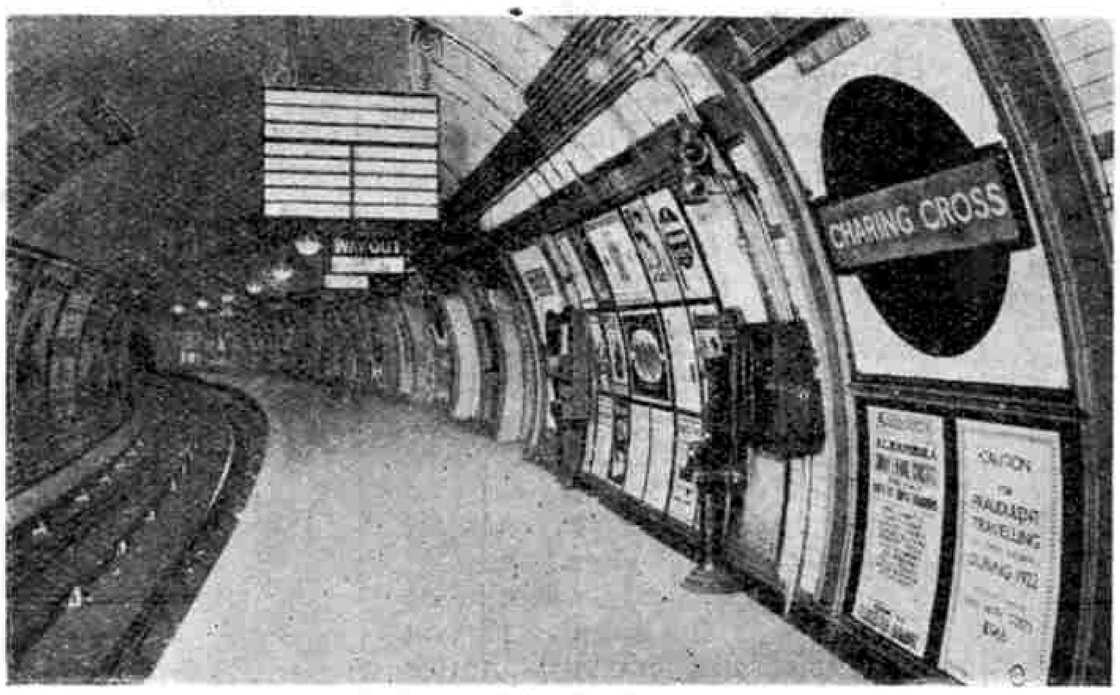
Apart altogether from the cutting and construction of the tunnels, which was itself a wonderful engineering achievement, the Underground is a triumph of organisation and good management. Here are to be found all manner of labour-saving devices and precautions for safety, embodying some of the cleverest inventions imaginable.

"Safety First"

From the time of the early workmen's trains to the after-midnight theatre service, a long succession of underground trains is run throughout the day. In the busiest times—when the city workers pour into the city in the morning, and when they rush home in the early evening—as many as forty trains may pass each station in an hour. The trains travel rapidly, and as they stop for even less than a minute at the stations there is no time wasted! Passengers quickly alight and others board the trains, urged by the officials' "Hurry up, please" All is bustle and excitement, yet it is an orderly speeding-up, which is very different from an excited and disorderly crowd. Because of the splendid organisation, accidents are of very rare occurrence, either on the platforms or on the lines.

Travelling in Comfort

Those who have read of some of the difficulties and discomforts experienced by workers in a coal mine might imagine that travelling several hundred feet beneath the ground would be an unpleasant experience. Such is not so in the case of the London Underground, however, for everything is done to make passengers as comfortable as possible. On entering a station they are taken down to the level of the railway by commodious lifts. Where the lifts are situated a short distance from the platform, the walk is along passages lined with white glazed bricks, and brightened by the addition of numerous posters, tastefully reproduced in colour. Indeed, all passages and stations are brightly lighted by electricity, and the air is always fresh and sweet being kept in constant circulation by a special ventilating system.



Charing Cross Station on the Underground

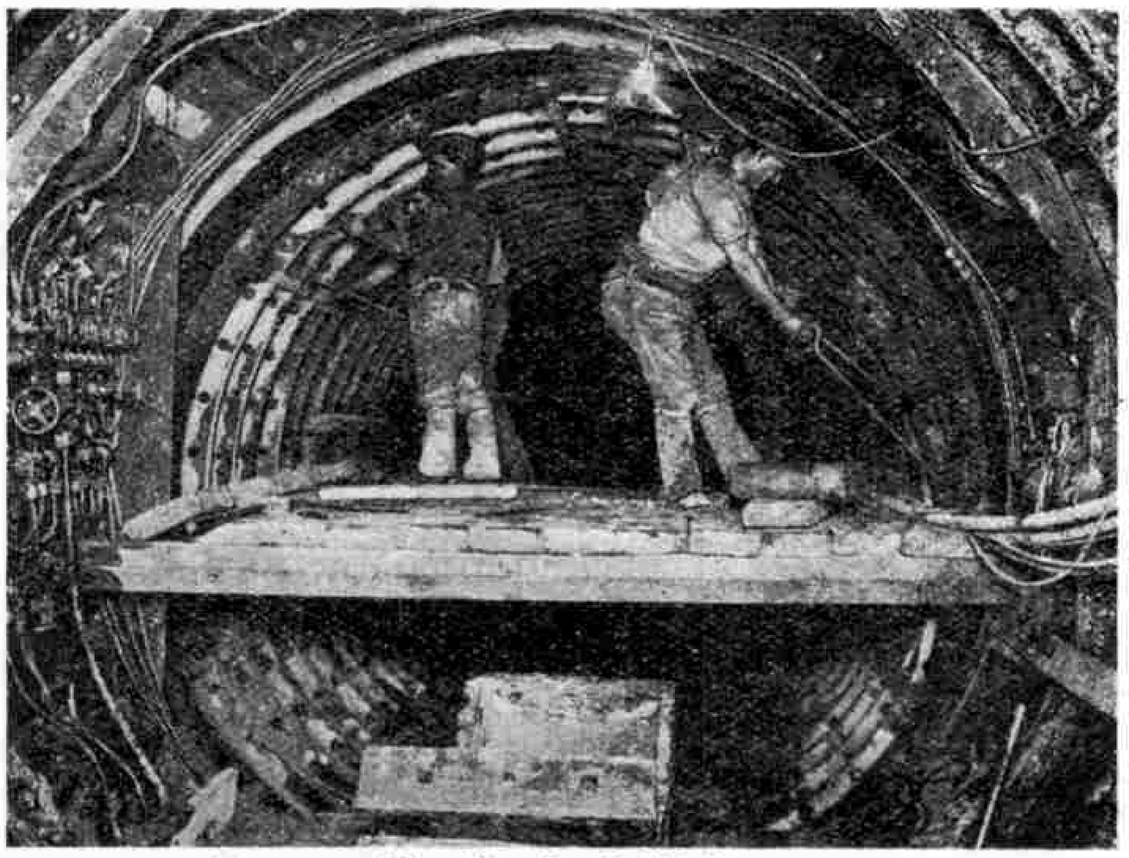
The trains run in circular tunnels, lined with metal rings rivetted together. The tunnels are therefore really huge steel tubes through the ground beneath London, and from this fact the Underground obtains its more familiar name of "Tube." Each tube accommodates a single line of rails, and in order to eliminate danger as much as possible, the trains run in one direction only.

The Greathead Shield: A Wonderful Invention

The boring of the tunnels was made possible by the Greathead Shield, an invention that has greatly simplified tunnelling. This device consists of a powerful steel plate, of the same diameter as that of which the tunnel is required. It is fitted with a cutting edge to pierce and break down the rock and soil that it encounters. The shield is driven by a number of hydraulic rams, and as it moves forward a ring of iron is built into position immediately behind it. In the accompanying illustration we see workmen setting one of these rings in position. At the same time the earth from the working-face is removed by a rotary excavator. With these two appliances, the shield and the excavator, a tunnel may be driven 20 to 25 ft. or even more, in a day.

Working in Compressed Air

Tunnelling under London is more difficult than tunnelling in other circumstances, however, and the obstacles encountered are even more numerous. For instance, a stratum of water-bearing gravel and clay may be struck, in which case the work must be carried on in a special chamber. In order to keep out the water the air must here be under pressure that varies from 25 to 41 lbs. per square inch, as against 16 lbs. normal pressure. Because of this, only men of exceptional physique are employed in this work. Even those



The Greathead Shield

men must pass through an intermediate pressure-chamber before entering the compressed air. Thus they encounter the full pressure only by degrees, as otherwise bleeding at the nose and ears would occur.

Having closed the outer door of the air-lock, the air is allowed into the inner chamber through a valve, and the inner door is then opened, the men stepping into the compressed air.

Trains Run 21 Hours Each Day

Even when the construction of the Tube is completed there is a considerable amount of reconstruction and repair work necessary to keep the permanent way in order.

As the trains are running continuously all day, these repairs have to be carried out at night, during the time when the traffic has stopped. As the trains only cease to run at 1-15 a.m., and as the next trains commence at 4-45 a.m., all necessary work must be done in these 3½ hours respite. The track, the signalling, the lighting installation, the power plant, and the hundred and one other details, must be attended to.

In our illustration is seen the permanent-way gang at work on their nightly task, after the trains have ceased to run.



A Gang at Work on the Permanent Way

A Machine that is Almost Human

Of the many ingenious devices for time and labour-saving to be found in the Tube, one of the most wonderful is the Passimeter. This mechanical apparatus combines the duties of booking-clerk, barrier-attendant, and ticket-inspector. Here a ticket is issued mechanically to the intending passenger, and after it has been snipped by the machine, the passenger is allowed to pass through the barrier. His passage is recorded by a kind of cyclometer, which counts the number of passengers and records them as required. The Passimeter eliminates the necessity for employing several men, who would be otherwise necessary.

Another wonderful device is the Escalator, or moving staircase, fitted at several stations, notably Earl's Court. On page 103 is shown one of these moving stairways with the steps on the left-hand stairway removed, disclosing the mechanism beneath. The stairway on the right brings passengers down to the station, and that on the left takes passengers up to the road level.

How the Moving Staircase Works

Leaving the trains, and wishing to ascend to the road level, the passenger finds that a part of the floor in front of him is moving. He notices that when any particular section of the floor approaches the incline, it forms itself into a series of steps, all of which move upward at the rate of five miles an hour.

At each side of the steps is a hand-rail moving at the same speed as the steps. By stepping on to the moving floor and taking hold of the hand-rail, the passenger is carried upwards to the road level, without the exertion of having to climb hundreds of steps. If he is in a particular hurry, however, he may leave his original step and walk up the staircase, as well as being carried with it. By so doing, he arrives at the top sooner than if he had maintained his position on the original step.

Only One Journey Allowed !

At the top, the steps again flatten themselves out and form floor that is continually moving forward. The passenger steps off this moving floor on to the ground, and so gains the street.

Travelling on a moving staircase is great fun, but the officials are particularly watchful that Meccano boys do not spend a happy two or three hours, travelling up one staircase and down the other ! If you visit the Tube you must be content with a single trip only, up or down the staircase, on each occasion that you enter the station.

A Complete System that Links Up all London

The illustrations on these pages are from photographs taken on the underground system known to Londoners as the Hampstead and Highgate Tube. There are also other London systems, however, including the Bakerloo Tube, the Metropolitan Railway, the Central London and the District Railway. These systems link up all London and its many suburbs on either side of the Thames. If it were possible for us to obtain an X-ray view of the ground beneath London, we should find these tube railway tunnels under the great city, like rabbit warrens, and forming a series of tunnels quite distinct from the enormous number of subways, cellars, sewers, and gas and water mains.

The track of the District Railway runs both underground and on the surface. Part of the underground portion, known as the Inner Circle, embraces nearly all the important stations in London, both in the East and West and in the City. This is a circular track with no terminals, the trains continuing to follow each other around the circle at intervals of only a few minutes. The drivers and conductors are relieved when necessary at certain specified stations.

(To be continued)



The Passimeter—a Wonderful Labour-saving Machine

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SPECIAL ARTICLE II.

JAMAICA.

The Famous Llandovery Falls.

Imperial Penny Postage, or penny postage from and to anywhere in the British Empire, was introduced by Canada at Christmas, 1898, and was followed by Jamaica on May 24, 1899. Foreseeing that this departure would cause a great increase in the bulk of her Colonial correspondence, Jamaica seized the opportunity to introduce the beauties of her island to the British beyond her coasts by issuing (on May 1, 1900) her first picture stamp.



This stamp, a view of Llandovery Falls, was larger than the regular size, and was first issued in an all-red colour. Although the colour was perhaps quite British, the stamp printed thus was hopeless as a work of art. Later (September 25, 1901) the stamp was printed in two colours, the centre or view in black, and the border in red, giving a more artistic result.

It has been claimed that the view depicted on this stamp is Welsh scenery, but in reality it was copied from one of a series of photographs sold by the local tradesmen, the Falls being situated in the district of St. Ann, Jamaica.

Keen observers have pointed out that just above the RY of LLANDOVERY is a rock that appears as the figure of a man. This has been stated to be Sir Henry Blake, Governor-General of the island at the time the photograph of the Falls was taken. Dr. James Johnson, who was the photographer of the picture, states that no one was there at the time and that the supposed man is but a rock projecting from the water!

The official figures state that 92,918 stamps were printed in the all-red colour, in two printings dated July 1900, and February 1901, respectively. This gives the date of the first printing as being later than when the stamps were actually issued (May 1, 1900), so that it would seem that there was another printing prior to those given by the officials. The figures for the black-and-red stamp are given as being 261,924 stamps, in six printings, the last being dated November 27, 1903.

R.K.G.

ESSAY COMPETITION

The attention of Overseas Stamp Collectors is drawn to the Essay Competition, particulars of which appear on page 111.

Papers and How to Identify Them

A STUDY of the various kinds of paper on which postage stamps are printed is interesting, and often the knowledge thus gained is a valuable acquisition. As in the case of watermarks, a particular variety of paper may change the value of a stamp from pence to pounds.

Stamp papers may be divided roughly into two classes:—(1) General, and (2) Special. The former class, which includes those papers used by many stamp issuing countries, is commoner than the latter class, which has been used only on one or two occasions in order to meet some special requirement.

"General" Papers

Blued paper, which is sometimes described by the French word *bleuté*, is a paper that has accidentally been turned bluish, either in its manufacture or by the ink with which the stamp has been printed. The imperforate penny red of Great Britain, issued in 1841, is printed on blued paper.

Chalk-surfaced (or *chalky*) paper is a term incorrectly used to denote *coated* paper. This is paper that, although quite normal paper in all other respects, has a chalky surface. The chalky surface makes it impossible to remove the postmark on a used stamp without also removing the design of the stamp itself. Many King Edward stamps of Great Britain are printed on this paper, and about half the current British Colonial stamps. The test for a coated paper is to pass the milled edge of a silver coin across the stamp. If the paper is coated a thin line, somewhat similar to a pencil line, will appear; if the paper is not coated no line will show. If it is not desired to keep the stamp the simplest test is to boil it, for if the paper is coated there will be no trace of the design after a few moments.

Granite paper contains a multitude of coloured fibres, and was used for the 1881–2 and following issues of Switzerland. It was also used for the 1894 issues of Serbia, although these issues have also appeared on ordinary paper. The stamps of Austria in 1890 also appeared on granite paper only.

Laid paper is watermarked with a series of parallel lines close together. These lines are caused by the impression of the wires forming the tray on which the moist pulp is laid (hence the name) during one stage of its manufacture. There are many stamps printed on this paper, one example being Serbia 1905. (Compare this paper with *bâtonné* paper described below).

Pelure paper is about the thickness of tissue paper but considerably stronger and harder, and usually has a greyish tint. Good stamp mounts are made of this paper.

Quadrillé paper is watermarked with crossed lines forming squares or rectangles. The 1892 issue of the 15c. of France was printed on this paper.

Wove paper is of plain, even texture, and is most commonly used for books and newspapers. The "*M.M.*" is printed on wove paper, which is used for the present stamps of Great Britain, as well as the majority of other stamps.

"Special" Papers

Special papers are only used for one or two stamp issues. There is, for example, the *Basted Mills* paper, made by the Basted Paper Company and used for the December 1901 issue of New Zealand. This paper is thin, hard, closely wove, and watermarked with a double-lined "N Z" and Star. The previous issue of New Zealand (February 1901) with the same watermark, is on *Waterlow* paper, supplied by Messrs. Waterlow and Sons, of London. This paper is thick and soft. *Cowan* paper was also used for New Zealand stamps (May 1902), and was supplied by Messrs. Cowan and Sons. It is thin wove, and when without watermark is difficult to distinguish from other thin papers.

Bâtonné paper has thick watermark lines wide apart, the paper between the lines being either plain wove or laid. This paper should be carefully distinguished from laid paper, which has been described above. Examples of both kinds of *bâtonné* papers may be found in the official (black) stamps of Poonch, an Indian Native State.

Dickinson paper, named after its inventor, was used for the 10d. and 1/- embossed stamps of Great Britain and for the early issues of Bavaria, Schleswig-Holstein, Switzerland and Wurtemburg. Continuous threads of silk are embedded in it during its manufacture. These threads perform the same purpose as a watermark and prevent forgery owing to the difficulty of reproduction.

Gold-beater's skin. This is a transparent tough paper that, incidentally, is incorrectly named. On the back of this paper were printed the 10 and 30 sgr. of Prussia issued in 1866.

RECENT ISSUES

HOLLAND. Silver Jubilee Issue.



Issued on August 31, 1923, to commemorate the Silver Jubliee of Queen Wilhelmina's reign, this stamp was designed by W. van Konijnenburg and J. van Krimpen, and printed by J. Enschede & Sons, Haarlem, the world-famous stamp printers. Four values were issued in the type illustrated and seven other values were also issued in another type. As a stamp the design is not very attractive for it reminds one rather of a "cubist" picture, and as a "picture" of the Queen it is hopeless and is easily outdistanced by the handsome portrait issued on the same occasion by several of the Dutch colonies.



NEXT MONTH.

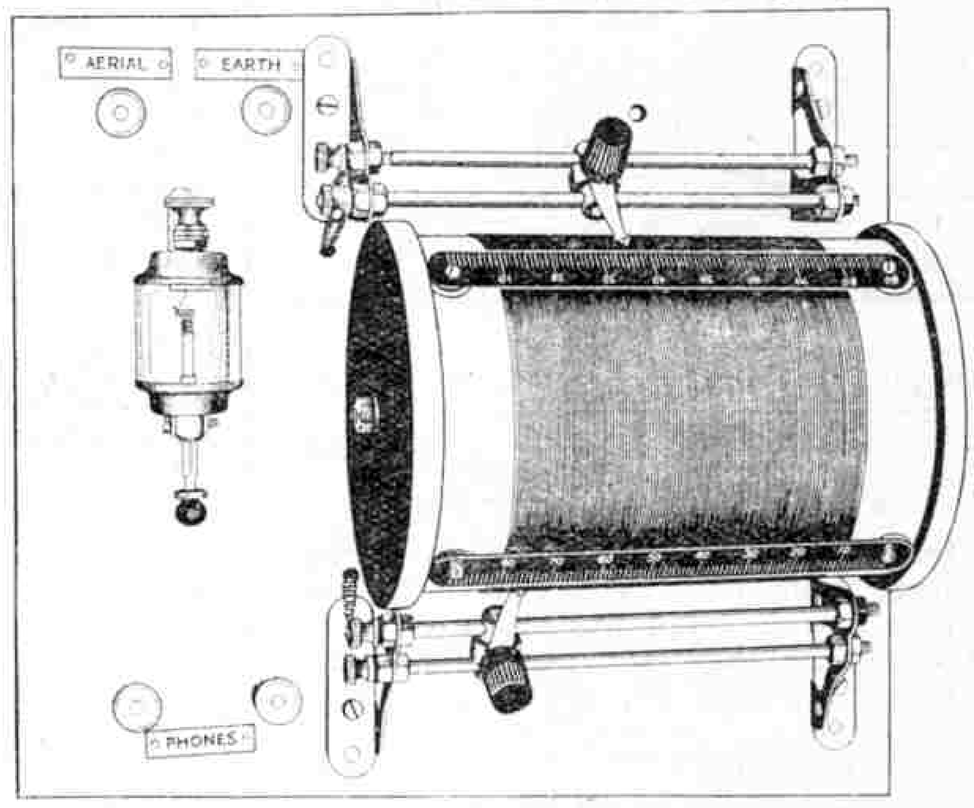
SOME INTERESTING WATERMARKS



The Meccano Double Headphones are British-made and of the highest quality procurable. They give loud, clear, undistorted reception, and will add greatly to the efficiency of any receiver. Comfortable to wear and easily adjusted. 4,000 ohms resistance. PRICE (post free), 15/6.

Meccano Ltd., Binns Road, Liverpool

LISTEN WITH MECCANO RECEIVER No. 1



The Meccano No. 1 Receiver is a highly efficient and splendidly finished instrument. The crystal detector is exceptionally sensitive and is enclosed in a glass chamber. Two slides are provided, one on each side of the inductance, giving greater selectivity and clearness of reception. Wave length: zero to 1,000 metres.

Dimensions of Set: $9\frac{3}{4}'' \times 8\frac{1}{4}'' \times 5''$.

PRICE, post free (as illustrated), 15/9.

Meccano Ltd., Binns Road, Liverpool

WIRELESS BARGAINS

Undoubtedly, the Finest Bargain on this page is our

5/- CRYSTAL SET 5/-

Every set tested 28 miles from a B.B.C. Station. Comprising Detector with 3-screw Crystal Cup and Sensitive Crystal, Wound Inductance Coils, Terminals, all wiring done, only needs a screwdriver to finish. Mounted on base-board, 6" by 5". Mahogany finish.

THE H.S. RADIO CO.,
36, Willes Road, LEAMINGTON
Money returned if dissatisfied.

A CHEAP AMPLIFIER
For your Crystal Set, and fill the room with music. No VALVES, transformers, etc. Any Meccano boy can make the wonderful "Varex" amplifier, cheaply, from our full drawings, etc., and "Carbex" contact, 2/6.
D. & Co. (Lewisham). Letters to 6, Loampit Vale, S.E.13.

LOUD SPEAKER (Automatic Telephone Co.'s) 2000 ohms resistance, with leads. As new, 25/-. Box 20, *Meccano Magazine.*

"CYMOSITE" CRYSTAL. Sensitive all over. If you fit "Cymosite" to your Wireless Set you know you have done everything possible, as far as the crystal goes, to make your set into a dependable instrument. "Cymosite" is the most popular crystal on the market. No need to twiddle about with the cat's whisker. Just make a light contact with the special contact wire supplied, and you get signals straight away. Every box is guaranteed, and contains 3 or 4 large crystals and special cat's whisker. Send P.O. for 2/6 to
A. HALL, 55, Durham Road, Low Fell, Gateshead,
and make an end to your crystal worries.

Make Your Own WIRELESS SET

Headphones .. 12/6 to 25/-
4,000 ohms Postage 6d.

Aerial Wire Copper, 100 ft., 2/4
Money returned if not approved.

Full List of Parts and Crystal Outfits } free for stamps.

C. LUCAS,
HOBBIES FAMOUS DEPOT,
35, Manchester St., LIVERPOOL

STATIC-RSTER



BOYS! Guard your Sets against harmful atmospherics

Price 2/9

RADIO SPECIALITIES,
57a, Denbigh Street, Pimlico, S.W.1.
Phone—Victoria 6463. *Generous Trade Terms*

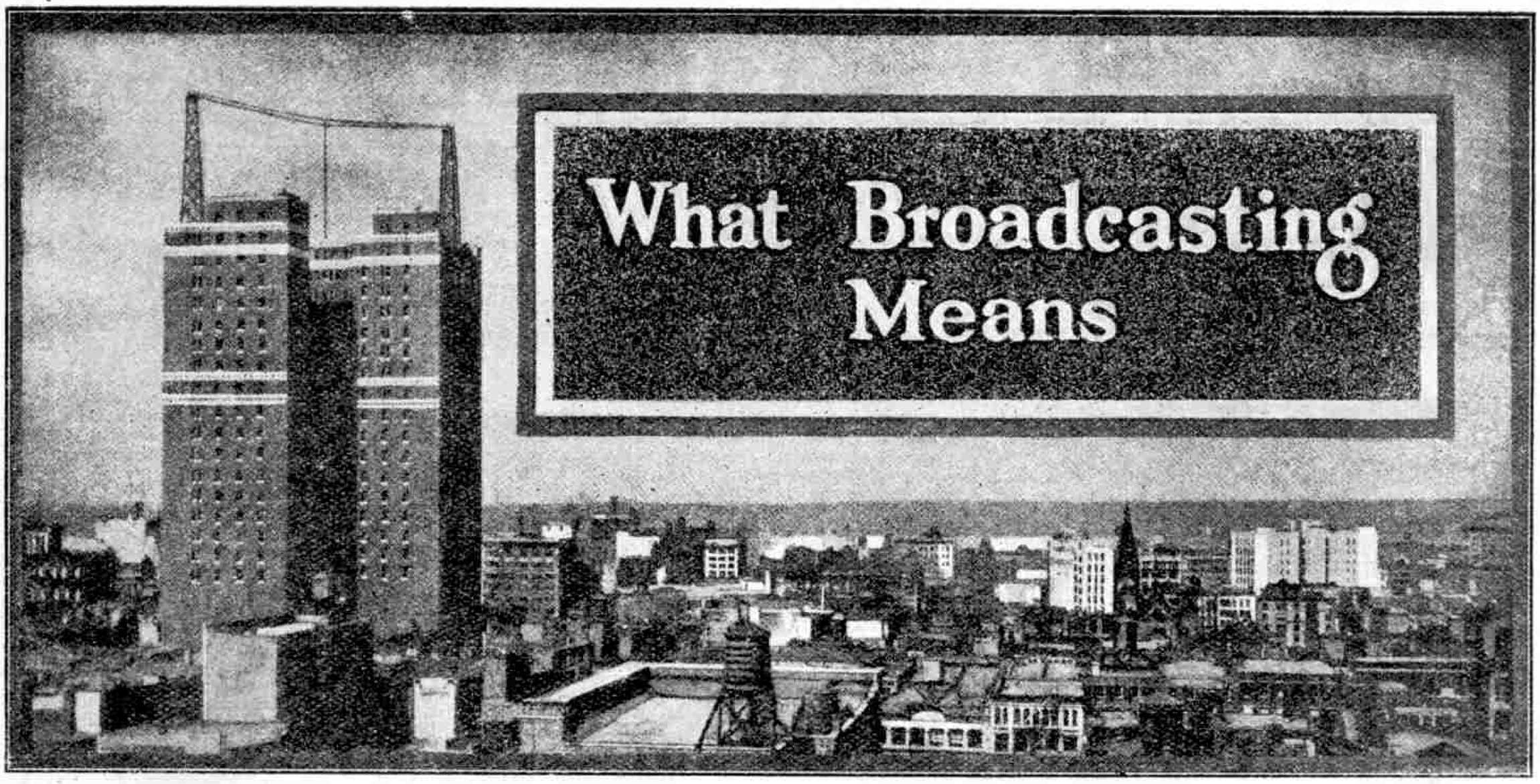
Support our Advertisers

It is hoped that every reader of the "*M.M.*" will patronise those firms who advertise in our pages, and whenever possible will make his purchases from them. When ordering goods or requesting catalogues it will help considerably if readers will mention to the firms concerned that they saw the advertisement in the *Meccano Magazine.*

A LOUD SPEAKER FOR 7/6

AMAZING RESULTS. **Postage 1/-.**





THREE or four years ago the word "broadcasting" might have applied to almost anything; to-day it has but one meaning, the sending out of programmes of music, lectures, news, etc., from certain wireless stations, to be received by all wireless receiving stations within range. One of the greatest charms of "listening-in" is that we do not have to leave our fire-side to go to concerts or lectures. Instead, the concerts and lectures come to us. But there is a danger that this easy method of obtaining an evening's pleasure may cause us to forget everything but our own little receiving apparatus, so that we fail to realise the tremendous amount of work that has to be done before the music or lecture reaches our ears.

Broadcasting is the most wonderful development of radio telephony. It enables those who live in distant towns to listen to the finest music, which without broadcast would be available only to those living in our great cities. The most isolated farms and villages are now able to share in the entertainment of a great metropolis.

Broadcasting Covers a Wide Area

Sitting in our own room listening-in, it is not easy for us to avoid the feeling that the music is being sent from the transmitting station straight to us, or at any rate in our direction only. But to appreciate the real wonder of wireless we must not forget that the music we are hearing is being heard also by listeners-in everywhere within working range of the station, no matter whether they live north, south, east or west of it. The electric waves, by means of which the music reaches us, are sent out from the transmitting station in every direction at once. Think of the surface of a pond and the ever-widening rings that spring into existence when a stone is thrown into it. Imagine the stone to be the broadcasting station, and the rings to be the electric waves, and you have a good illustration of what is taking place during the sending-out of a broadcasting programme.

Singing to an Unseen Audience

This is perhaps the most wonderful feature of broadcasting. A lecturer, standing before a microphone in a room at the broadcasting station, may talk to thousands of people at once, no matter whether they live in towns or villages near or far from the broadcasting station. So, too, the efforts of a singer or an instrumentalist may be appreciated by this vast unseen audience.

It is rather interesting to compare the position of a singer at a broadcasting station with that of a singer at an ordinary concert. The latter has to face his audience and conquer his stage fright, but has the compensation of being in personal touch with his audience and of hearing their applause after a song well sung. The singer at a broadcasting station has no stage fright to contend with, but has the uncanny experience of singing to an invisible audience, and of not having any indication as to whether he is succeeding or failing in his task. The singer has at any rate the advantage of personal security. One hears now and then of various unpleasant articles being thrown at singers whose efforts are not appreciated by their audience. But however much listeners-in may rage and storm at a particular broadcasting singer, they are quite helpless in the matter, and it is no use their thinking of expressing their disgust by hurling bad eggs or ancient cabbages at the artist!

At the Broadcasting Station

Day after day the great broadcasting stations of this country send out their programmes, and we may just take a "peep behind the scenes" and see what really is taking place The artists engaged for that particular programme are gathered in a specially built room, thickly carpeted, and with walls, windows, doors and ceiling heavily draped. A singer stands before a microphone, and the accompanist is seated at a grand piano, above the opened lid of which hangs another microphone, electrically connected to the first. Signals are exchanged with the room containing the transmitting apparatus, the transmitting switch is closed, the pianist commences the introductory bars of the accompaniment, and a moment later thousands of listeners-in are enjoying the song. The programme may also include other singers, instrumentalists, an orchestra, lectures on various topics of general interest, items of the latest news of the day and results of football and other matches. As the programme continues, one's imagination roams away to the thousands of homes in which listeners of all ages are enjoying a first-class entertainment brought to them by the unseen, silent, electric waves.

Securing Good Transmission

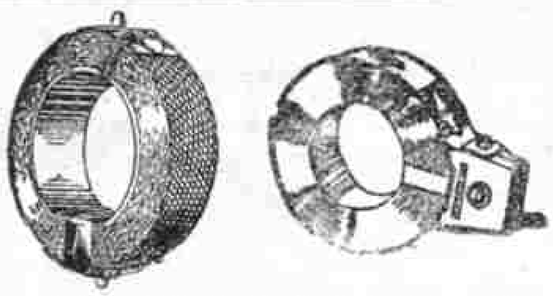
Now let us examine the broadcasting studio in more detail. First of all it may be wondered why the room is so heavily curtained everywhere. This is to ensure that only the pure tones of the singers or instrumentalists are transmitted. Without the drapery the musical sounds would be mixed with echoes from walls and ceiling but such echoes are effectually muffled by the curtains. Again, we have spoken of two microphones being used in the transmission of a song. But the transmission of an orchestral item may require several microphones, distributed carefully among the players according to the nature of their instruments. Only in this way can an orchestral performance be transmitted with the tones of all the instruments in proportion.

Then we must not forget the announcer, the voice of the station. He sits before another microphone, and acts as a guide to the listeners. He is always extremely

Continued on page 103

FOR DEPENDABILITY OF OPERATION USE

"IGRANIC" RADIO DEVICES



HONEYCOMB INDUCTANCES

(De Forest Patent No. 141344).

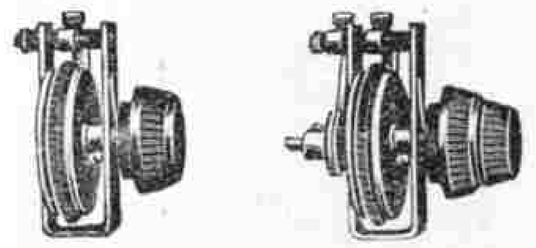
These world-famous coils are renowned for their high efficiency, low self-capacity, small absorption factor and minimum high frequency resistance. No dead-end losses. Each turn surrounded by air pocket. Made in two types, gimbal and plug mounted. Wave lengths approximately 100 to 25,000 metres. The only coils that uphold their claim for negligible losses. Prices vary with sizes.



INTERVALVE TRANSFORMERS

(Patent No. 205013).

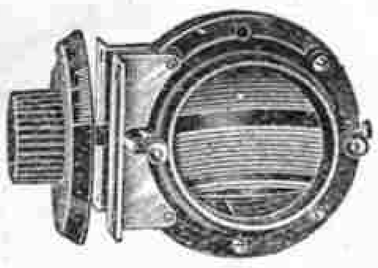
Designed for the distortionless reproduction of speech and music. The steel shroud effectively shields from external interference. Recent improvements in design render it the finest amplifying transformer obtainable. Prices : Shrouded, 21/-. Open, 20/-.



FILAMENT RHEOSTATS

(Patent No. 195903).

A splendid instrument for filament control under all conditions. Novel method of construction ensures smooth and silent operation. Designed for individual valve control. Adjustable contact finger permits of resistance values from zero to four ohms by fine variation. Supplied in two types, plain and vernier. Prices : Plain, 4/6. Vernier, 7/-.



TYPE "H" VARIOMETER

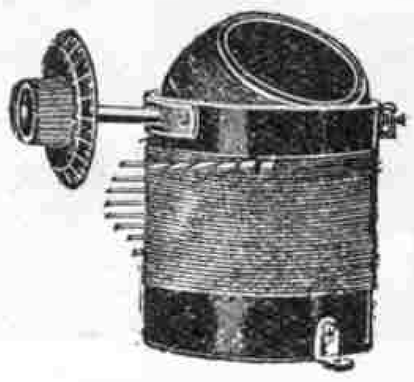
Recommended for use in the aerial circuit of crystal and valve sets. Wave length range approximately 150-600 metres, with P.M.G. standard aerial. Stator and rotor best quality mouldings, windings self-supporting and impregnated solid. Price, with knob, dial and fixing bracket, 15/-.

Obtainable from all Dealers.

TYPE H.R. VARIOCOUPLER

Stator and rotor of hard moulded insulation and windings impregnated solid. Tappings on primary enable fine tuning to be obtained, thus eliminating condenser. Coupling continuously variable over wide range. Price, with knob, dial and fixing brackets, 19/-.

Write for Lists Z. 171.



Glasgow.
Manchester.
Bradford.

149, Queen Victoria St., LONDON.

RADIO IGRANIC ELECTRIC Co Ltd WINDINGS

Works: Elstow Road, BEDFORD.

Cardiff.
Newcastle.
Birmingham

NO BOY OR GIRL can afford to be without the world-renowned and largely-advertised

SECCOTINE

(Regd. Trade Mark)

Tubes 4½d., 6d., 9d. Everywhere.

The best general adhesive the world knows. For wood, leather, bone, paper, etc., objects large or small. Used in bulk for manufacturing purposes. Of great utility to boys and girls who long to make things.

FIRMAS (Heat Seccotine)

(Regd. Trade Mark)

Tubes 6d.

For glass, china, delph, etc. Articles joined with it can be boiled without coming asunder.

McCAW, STEVENSON & ORR, LIMITED,

The LINENHALL WORKS, BELFAST.

Telegrams : "GLACIER, BELFAST."

Telephones : 4261 (3 lines).



BRIGHT IDEAS

This column is reserved for dealing with suggestions sent in by Meccano users for new parts, new models and new ways of making Meccano model-building attractive. We are always pleased to hear from any Meccano boy who has an idea which he considers will be useful in the Meccano system.

R. Bampas (Johannesburg, S.A.).—(1) We are considering an increase in the variety of Bevel Gears. (2) Regarding your idea for a ratchet element, we shall have to discover its applications, other than the one you mention. (3) Architraves and Corner Brackets serve the same purpose as your suggested bracing strips. (4) We now list Chassis "Tyres" (No. 142, price 4d. each).

J. Calder (Epsom).—(1) We are continually increasing our range of rolling stock, but the particular type of bogie truck you mention has not yet been added. (2) A signal box with levers is in course of preparation. (3) We propose altering the brake lever from the curved rail to the straight rail.

T. J. Cooling (Bath).—Two Hornby Presentation Train Sets are listed. They consist of a comprehensive selection of items, but are not mounted. We fear that it would be quite impossible to market them in the form you suggest as they would be too bulky and unwieldy. We quite see the advantages of your idea.

Jack Mason (Auckland, N.Z.).—(1) Thanks for your long list of suggested new parts, but the majority are merely modifications of existing parts. (2) A Flanged Wheel of 2½" diameter may be made by bolting a Flanged Disc to a Face Plate.

H. A. Freeman (Willingdon, Sussex).—We see the point you raise in connection with the butting of two Double Angle Strips. An alternative method of overcoming this difficulty is to extend the Double Angle Strip one hole and join by means of a Strip. An extra hole in width should not make any considerable difference to the general construction.

E. W. C. White (Wisbech).—We are experimenting with a sliding action on the lines of your suggestion.

Nicholas Eyres (Richmond).—We shall go into the matter of laterally-curved rack strips. It is not our intention to produce Gauge 1 track at the moment. The small demand for this size does not justify the manufacturing outlay.

Bert Hawkers (Romford).—We have decided to introduce a transverse strip into the Meccano system. Particulars will be furnished later.

W. R. Skelton (Kingsdown, nr. Deal).—It is not practicable to provide curved rods. Curved or bent elements cover an extremely wide field, and to provide for this is quite out of the question. The present Coupling No. 63 will give you an angle connection similar to that depicted in your sketch.

P. S. Reed (Upper Deal).—Small tools such as you mention would only have an ornamental use and their introduction would not be justified.

Brian Harden (St. Albans).—A laterally curved strip is restricted in use to its own particular diameter. The matter of this type of curved strip is exercising our attention.

Reg. F. Whittle (Bacup).—A stop on the rail worked in conjunction with the signal will require a little thought and working out, but we shall give the idea careful consideration.

G. F. Chell (Wolverhampton).—We may shortly be able to commence the designs of an electric locomotive.

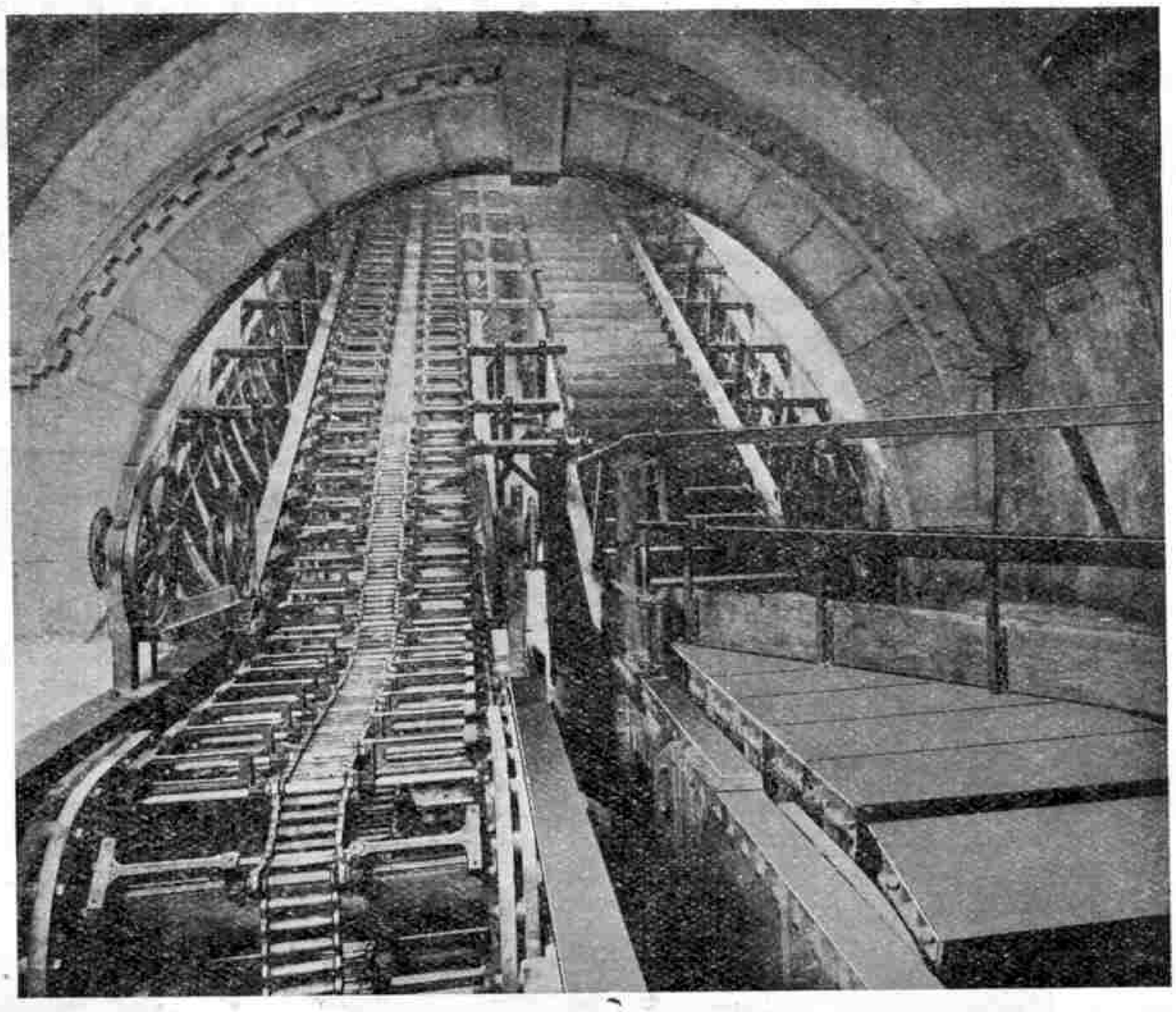
Anthony A. Fletcher (Newick).—Your complaint regarding the loosening of the wheels on the axles is an isolated one. The fault is due, we think, to some slight defect not noticeable at the time of assembly. They would be replaced under our Guarantee. We are considering the question of coupling up the driving wheels. Please accept our best thanks for your congratulatory message.

H. W. Vaughan (Blaenau Festiniog).—We appreciate the value of your suggested ferrule, for protecting the threads of the screwed rod when running in a bearing or when a wheel is fastened to it. We are afraid, however, that there is not a sufficient margin of space between the rod and the boss hole to permit of the introduction of such an element. Anticipating a possible suggestion from you on this point, a slight reduction of the diameter of the screwed rod could not be entertained as the present size is the adopted standard.

Stanley Dunn (Bridgend).—The matter of a sliding gear has already been dealt with in these columns. We are considering the most suitable form to adopt.

New Meccano Parts

No. 16b.	Axle Rods, 3"	...	each 1d.
,, 141	Wire Lines (for clock)	,,	9d.
,, 142	Rubber Rings (Chassis Tyres)	,,	4d.



The Escalator, or moving staircase, at Earl's Court station on the Underground Railway. Our photograph shows the boards removed from the left-hand staircase, and on the right the tread in position. The working of this staircase is referred to in the article on page 97 of this issue.

What Broadcasting Means—(*cont. from p.* 101)

polite, very apologetic if anything goes wrong or there is any delay, and guides us through the programme, item by item.

Broadcasting Opera

The studio of a broadcasting station has its limitations. For instance, an opera performance on a big scale can only be held in a properly-appointed theatre. In such a case the ordinary land telephone line is used.

Suppose it is decided to broadcast an opera from Covent Garden Theatre. Sensitive microphones are fitted at various points in the theatre, so as to catch every sound from the stage. These microphones are connected by a land line to "2LO," the London broadcasting station. Shortly before the opera is to commence, 2LO announces to its listeners that it is "now switching over to Covent Garden." Then the microphones at the theatre are switched in, the orchestra commences the overture, this is transmitted by the land line to 2LO, amplified, and then broadcast by wireless just as if the performance were taking place in the ordinary studio. In this way music lovers all over the country are able to hear operatic performances by the finest artists, and similarly concerts and speeches can be broadcast from the actual hall in which they are taking place.

Land-line transmission also enables a broadcasting studio to be in a building in the centre of a city, and the transmitting apparatus and aerial in another district. In the case of 2LO, for example, the studio where the artists perform is in Savoy Hill, while the transmitting apparatus and aerial are at Marconi House in the Strand. A land-line connects the two places and makes it possible to broadcast from the studio just as though the artists were in the same building as the transmitting apparatus.

Into the Land of Fun—(*cont. from page* 93)

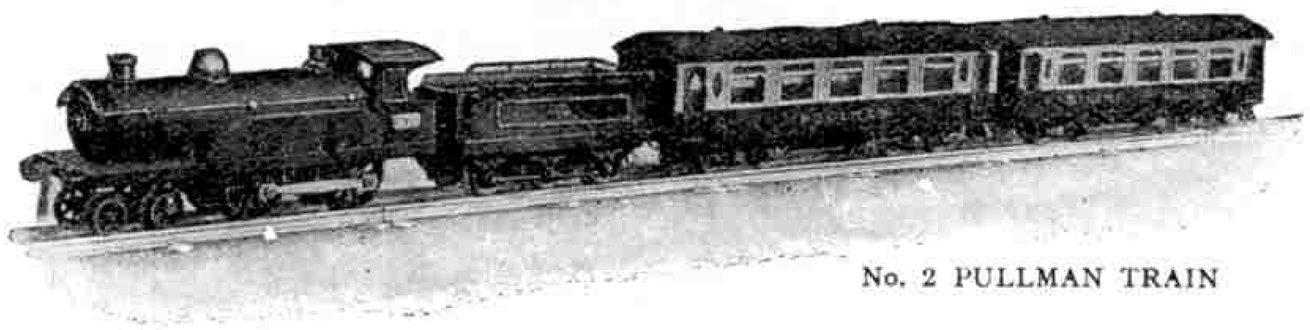
shaft) out of existing Meccano parts. The difficulty was finally overcome (as is shown in Fig. E in the October "*M.M.*") by using two Reversed Double Angle Brackets, connected to Couplings carrying the driving shaft. Shortly afterwards a new part fitted with four set-screws, and consisting of two interlocking parts, which are themselves detachable, was introduced. This was No. 140, Universal Coupling. This is a great improvement on the original arrangement, as the made-up coupling was not entirely satisfactory in use, and was inclined to work loosely. The Universal Coupling may also be used to form a flexible joint on two pieces of shafting each of which is being driven at a different angle.

Incidentally, this part is the very latest addition to the Meccano system up to the present time. I hear from the Factory, however, that there are several other new and important parts under consideration, and when these are introduced, full particulars will be announced in future numbers of the "*M.M.*" Meanwhile, if any of my readers have suggestions for new parts that they consider would prove of value, I strongly advise them to send full particulars to the Editor. In describing new parts, it is always advisable to give examples of the uses to which these new parts may be applied, as this is a great help to the experts who consider their merits. It would also be interesting to hear of any specially interesting purposes to which the new parts, mentioned on this page, have been applied, and I will give 10/6 for the best suggestion in this connection. Write your suggestion neatly—with sketches if necessary—on one side of the paper only, and address your letter to "Spanner," c/o Meccano Ltd., Liverpool. Post before May 30.

HORNBY CLOCK WORK TRAINS

THE TRAINS WITH THE GUARANTEE

A most valuable and remarkable feature of the Hornby Train is that it can be taken to pieces and rebuilt just like a Meccano model. All the parts are standardised, and there is as much fun taking Loco, Tender, Wagon, and Coaches to pieces and rebuilding them as there is in playing with them. Any lost or damaged parts may be replaced with new ones.



No. 2 PULLMAN TRAIN

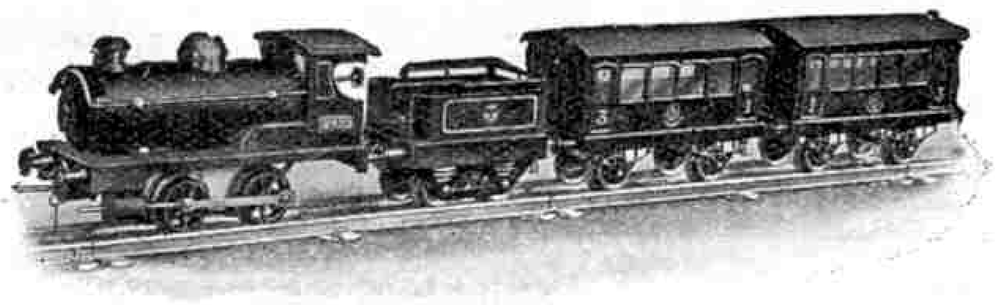
HORNBY TRAIN PRICES

No. 1

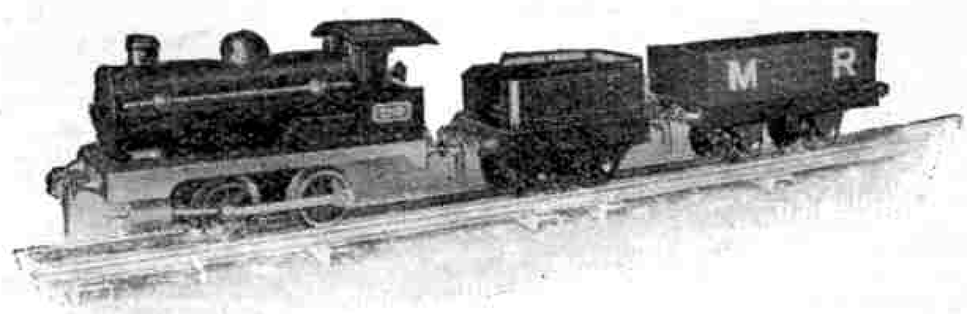
Goods Set	... ...	**25/6**	Wagons	each	**3/9**
Passenger Set	... ...	**35/–**	Tenders	,,	**3/6**
Locos	each	**16/–**	Passenger Coaches	,,	**6/6**

No. 2

Goods Set	... ...	**45/–**	Wagons	each	**3/9**
No. 2 Pullman Set	...	**70/–**	Tenders	,,	**4/–**
Locos	each	**30/–**	Pullman Cars ...	,,	**16/–**



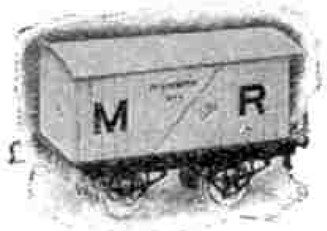
No. 1 PASSENGER TRAIN



No. 1 GOODS TRAIN

Clockwork Train Rolling Stock and Accessories

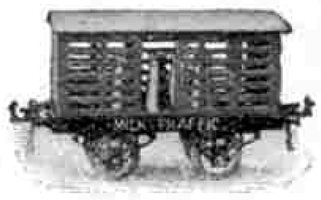
All Train Accessories are built in correct proportion to the Hornby Trains and have that beautiful finish which is the great feature of the Hornby system. Many new accessories are being added this year. Ask your dealer to show you samples.



REFRIGERATOR VANS
Enamelled in white, lettered black. Each **4/6**



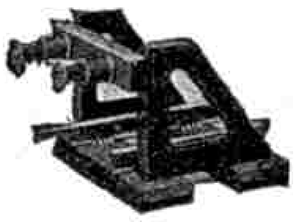
WINDSOR STATIONS
Excellent models, beautifully designed and finished.
Dimensions : Length 2 ft. 9 in., breadth 6 in., height 7 in. Each **12/6**



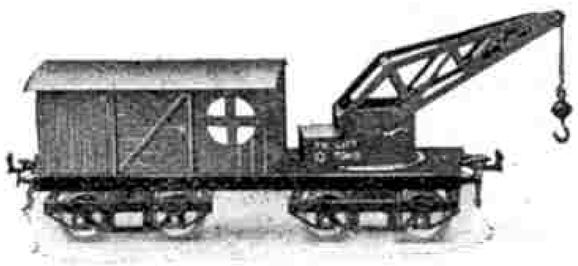
MILK TRAFFIC VANS
Fitted with sliding door, complete with milk cans. Each **5/–**



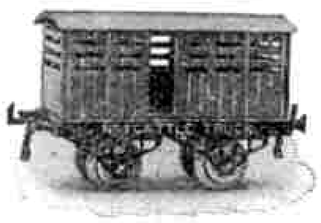
SINGLE LAMP STANDARDS
A four-volt bulb may be fitted into the globe.
Each **3/–**



SPRING BUFFER STOPS. Each **2/–**



BREAKDOWN VANS AND CRANES
Excellent finish. Beautifully coloured.
Suitable for 2 ft. radius rails only. Each **7/–**



No. 1 CATTLE TRUCKS
Fitted with sliding door.
Very realistic design.
Each **4/6**



TELEGRAPH POLES
Each **3/–**



ROTARY TIPPING WAGONS
Finished in colour.
Each **3/6**



TURNTABLES. Each **4/6**



GAS CYLINDER WAGONS
Finished in red, lettered gold.
Each **4/–**

FROM ALL MECCANO DEALERS



Fireside Fun

WE have received a very large number of requests that this page of "Fireside Fun" shall be continued throughout the summer months. Although it was originally intended to feature the page only in the winter, we feel compelled to respond to the insistent demands of our readers, and whenever possible we shall therefore include a page of "Fireside Fun" in each future issue. We would remind our readers that we offer 5/- for the best puzzle submitted every month, and 2/6 for every other puzzle used. This offer remains open until further notice.

* * * *

In our December number we gave several sentences commencing with the same word, syllable or sound, that are difficult to repeat, especially when repeated several times in succession. These tongue-twisters such as "truly rural" and "a pound of mixed biscuits," are evidently very popular with our readers, for we have received numerous requests for further examples. We have collected one or two interesting tongue-twisters, therefore, and print these. We are hoping to give two or three more next month. In the meantime if any of our readers know of any particularly good examples we shall be pleased to receive them and to pay for those used at our usual rates.

* * * *

A very good tongue-twister is the well-known verse about the sea shells:

She sells sea shells on the sea shore;
The shells she sells are sea shells, I'm sure.
So if she sells sea shells on the sea shore,
Then I'm sure she sells sea shore shells.

Repeated rapidly ten or twenty times this makes one sound like a tank engine shunting!

* * * *

Then there is the famous verse about Betty and the butter:

Betty Botta bought some butter.
"But," she said, "this butter's bitter,
But a bit of better butter
Will but make my butter better."
So she bought a bit of butter,
Better than the bitter butter,
And it made her butter better.
So 'twas better Betty Botta
Bought a bit of better butter.

* * * *

The letter "C," especially when followed by "r," gives plenty of scope for unruly tongues, as the following verse shows:

Captain Crackskull cracked a catchpoll's cockscomb;
Did Captain Crackskull crack a catchpoll's cockscomb?
If Captain Crackskull cracked a catchpoll's cockscomb,
Where's the catchpoll's cockscomb Captain Crackskull cracked?

* * * *

The tongue-twister about the woodchuck almost knots one's tongue completely. Try this in bed at night if you can't sleep and I will guarantee you will fall off before you can repeat it a hundred times! Say it softly though, or you'll wake the others, and they will imagine you are in some new kind of fit!

How much wood would a woodchuck chuck if a woodchuck could chuck wood? If a woodchuck could chuck wood, the wood that a woodchuck could chuck is the wood that a woodchuck could chuck, if the woodchuck that could chuck wood would chuck, or a woodchuck could chuck wood.

* * * *

Puzzle No. 17.

The Flock of Geese

Brown one day drove his flock of geese
And met with farmer Gay. "How much a-piece
For this flock did you pay?"
Says Brown, "I paid for all I drive
Just six pounds and a crown
And I'm going to sell them all but five,
At yonder market town,
When fifteen pence a head I'll charge
Above what they cost me.
And thus obtain a sum as large
As I gave for all, you see."

Can any reader state how many geese Brown bought, how much he paid for each, and what price he asked?

(Contributed by Master J. McGregor, of Govan, N.B.)

* * * *



"What an awful gash you have on your forehead!"

"Oh, next to nothing—next to nothing."

* * * *

This Month's Short Story

Barber, shave;
Man, sneeze;
Customer, dead:
Next, please!

* * * *

We never thought of that

Mother: "There now! I've read you the whole story of the Ark and you must go to sleep!"

Tommy: "Yes, but first tell me what would have happened if Noah had sent out a sea-gull instead of a dove?"

* * * *

"Yes, we have no—"

"This song about bananas makes me tired," said the Old Gentleman. "In my day we had songs like 'Ta-Ra-Ra-Boom-De-Ay' and 'Daddy Wouldn't Buy Me a Bow-wow.' Songs like those had some sense in 'em!"

Answers to Last Month's Puzzles

No. 11 Nothing.
No. 12 24 lbs.
No. 13 Ann's age: 18.
No. 14 Mary's age: 40. Ann's age: 24.
No. 15 79 days' voyage.
No. 16 25 miles.

* * * *



Waiter: "Did you have turtle or ox tail soup, sir?"

Diner: "I don't know—it tasted mostly like soap."

Waiter: "That was the turtle soup, sir. The ox tail tastes like paraffin."

* * * *

Puzzle No. 18.

The verses with the missing words that we recently printed have proved very popular, and we are printing another similar verse of this nature.

A..... sat in his..... gray,
Watching the moonbeams..... play,
On a keg that in the bushes lay,
And the leaves with their..... took up the song,
Thou..... the brave. Thou..... the strong.
To thee doth..... of great battles belong.
John Barleycorn, my king.

This verse has been submitted by Master Norman T. Nicholson, of Falkirk. The word in this case consists of six letters, the word in each case being different but composed of the same six letters in different order. The answer will be given next month.

* * * *

On mules we find two legs behind,
And two we find before,
We stand behind, before we find,
What the two behind be for!

* * * *

Tried in the Short Circuit Court

A man, arrested for assault and battery, was before the judge:

Judge: "What is your name, your occupation and what are you charged with?"

Prisoner: "My name is Spark, sir. I am an electrician, and I am charged with battery."

Judge: "Six days in a dry cell!"

We offer a prize of 5/- for the best puzzle submitted each month, and prizes of 2/6 each for any other puzzles printed.

Puzzles should be expressed as clearly as possible and the answers should be given in each case. Diagrams should be clearly drawn and letters should be addressed "Puzzles," Meccano Magazine, Binns Road, Liverpool.



THE MECCANO GUILD

The Secretary's Notes

During the past few weeks the majority of clubs have been holding Exhibitions and Socials, before finally bringing the Second Winter Session to a close. Secretaries' and Leaders' reports are now coming in, and I am very glad to note that in nearly every case the past session has proved entirely satisfactory, from the point of view of both pleasure and finance. Reports of so reassuring a character reflect considerable credit on the respective Leaders and Secretaries, on whom devolves the work of arranging successful programmes, lectures, etc., and keeping the members amused. This is no light task. It may be remembered that last month, when reviewing the progress of the Guild, I asked all members to help me to make 1924 a record year. This Second Winter Session has clearly shown that it will be no very difficult task, and if only steady progress is continued our endeavour will be accomplished in the next twelve months. To bring this about, however, it is essential that club members should not lose touch with each other during the summer months.

A Successful Session

Many Leaders have informed me of the wish of the members for the continuation of club activities during the summer months, and I have already received programmes for the summer from several clubs. I notice that these include arrangements for outings to places of interest, and indicate the formation of Cricket teams, and Tennis, Cycling, Rambling, Naturalist's and Photographic sections. These are only a few of the many enjoyable arrangements being made. Although Meccano has so sure a hold on the affections of all Meccano boys, it takes second place during the bright days of summer and long evenings, when members naturally prefer to be out of doors. I earnestly recommend those Club Leaders and Secretaries who have not already done so to make similar arrangements for continuing their clubs during the summer months. A General Meeting for the discussion of plans should be held and summer arrangements made. It will then be found how enthusiastic the members are. I should also like to say that I am only too glad to give full particulars and advice with regard to organising the various summer sections, if the Secretary will write and let me know the number of members and the kind of club it is proposed to organise.

Summer Activities

I continue to receive many letters from boys all over the world, saying how sorry they are that they are "unable to join the Guild because there is no Club near them." This is, of course, quite an incorrect impression, for any boy who possesses a Meccano Outfit may join the Guild, even if he is hundreds of miles away from a Meccano Club, as are many of our members Overseas. Such boys are called "lone members," but they are as much members of the world-wide brotherhood as if they belonged to a Meccano Club. "Lone members" are very loyal supporters of the Guild movement and are persistent in their endeavours to persuade their friends to join up. In many cases they eventually succeed in forming a Meccano Club themselves.

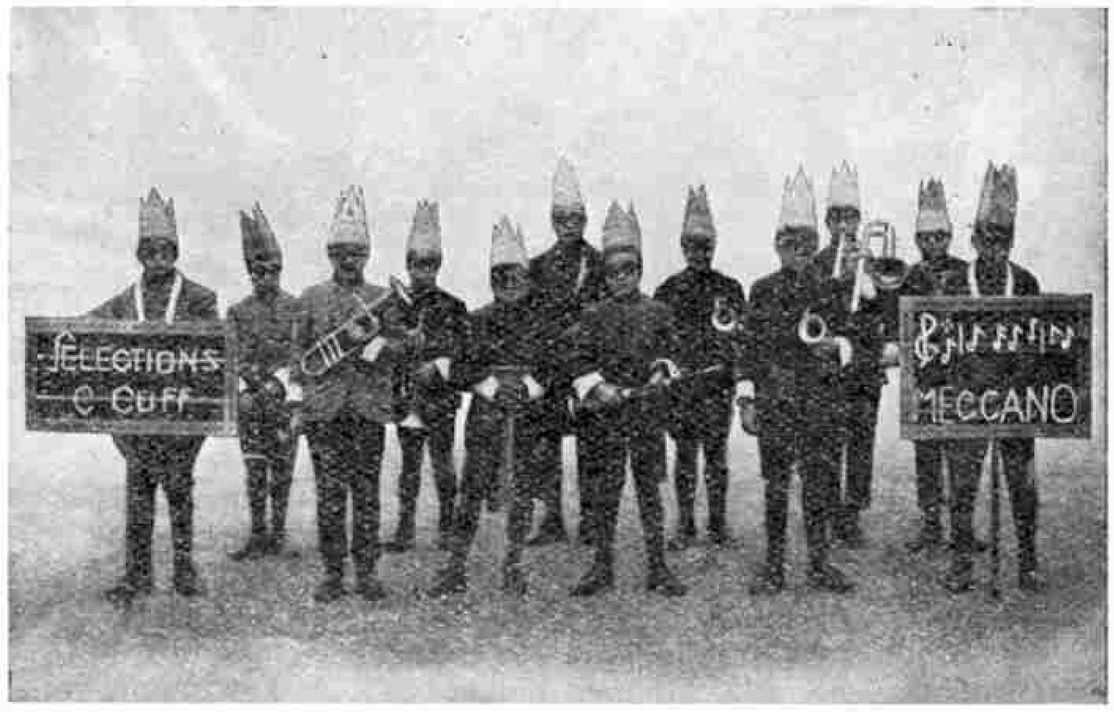
"Lone Members"

It should be clearly understood that no charge is made for enrolment in the Guild Correspondence Club. It is one of the privileges of the Guild of which members are strongly advised to take advantage. The Correspondence Club offers a wonderful opportunity for every boy to have a friend in any country abroad or in any town or city in England. At present I hear of French, Belgian, American, Canadian, Australian, South African and Indian boys waiting for correspondents in this country. Stamps, postcards or photos may be exchanged and correspondence may be either in English or in the language of the country where your correspondent lives. Any boy who has not yet joined should write to me at once for an enrolment form, which will be sent post free on request.

The Correspondence Club

Meccano Musicians from Somerset

Chard Club's Jazz Band



UNDER the able Leadership of Mr. J. S. Miller, the enthusiastic members of the Chard (Somerset) Meccano Club recently organised a jazz band. This was described in the local newspaper as being "an entirely new note in jazz bands" and the Club was unanimously awarded the First Prize in a local Carnival.

Apart from the music, perhaps the most striking feature of the band was the novel design of the "bandsmen's" costumes. These had red facings and white cuffs, which—although not clearly seen in the accompanying photograph—were decorated with various musical notes. The boys wore cardboard hats, each painted in different colours, with the points forming the triangular badge of the Meccano Guild. Banners made of Meccano girders with "notes" of strips, wheels, and bolts, created considerable interest among the spectators. The banner on the left in the accompanying illustration refers to the musical notes on the cuffs of the performers, and also, by a coincidence, to the name of the Meccano dealer in Chard. The banner on the right represents two or three bars of "Auld Lang Syne," one of the selections played "on the march" by the band.

I am sure that every member of the Guild will join me in wishing that we might see this successful jazz band, and also hear its full programme. It is to be regretted that the band cannot undertake a tour of Meccano Clubs!



CLUB NOTES

Den Haag (Holland) M.C.—The Club Leader recently gave a lecture on statics, to assist members in building cranes, bridges, etc., on correct principles. A model-building contest was also held, the entries being judged by two Engineer visitors. Competition was very keen indeed and the prizes were finally divided between three of the competitors. *Secretary:* Mr. H. G. Van der Sluis, 108, Stadoudersplein, 108 Den Haag, Holland.

St. Lukes' (London W.10) M.C.—Owing to the fact that several members have recently left the district, the past Session has not proved as satisfactory as was anticipated. It is hoped, however, to arrange an enjoyable programme for the summer months, and Guild Members living near Kensington are invited to join the club. *Secretary:* Master Leonard Burgess, c/o Mr. P. J. Betts, 178, Wornington Road, North Kensington, London, W.10.

Chard and Combe St. Nicholas M.C.—This club's recent innovation of organising a branch a few miles distant is proving very successful. Several interesting lectures were recently given on "Sound," "Model Building" and "Electricity." A Wireless Demonstration proved one of the most successful events of the Session. *Secretary:* Master L. Bailey, Combe St. Nicholas School, near Chard, Somerset.

Rolleston M.C.—A very encouraging report has been received from the Club Leader, who states that "every member is keen on making the Club a success." Lectures delivered by local gentlemen during the past session have proved exceedingly popular. An Exhibition and Concert was recently held to raise funds for purchasing a Club Wireless Set, as all the members are keen on Radio. *Secretary:* Master Phin Toon, Sherbourne House, Tutbury Road, Rolleston, Burton-on-Trent.

Ormskirk Scouts M.C.—The membership has recently been increased and several new recruits are expected before the Summer Session commences. A display of Meccano Models is being made in a local dealer's window, while preparations for a Model Exhibition are being discussed with a view to making Meccano more widely known in the district. *Secretary:* Cub Master C. E. Walsh, 113, Wigan Road, Ormskirk.

(*Continued on page* 107)

How to Run a Meccano Club

by the

Guild Secretary

Having found a Leader for the club, the next thing is to procure a suitable room. This should be as comfortable as possible, furnished with tables or benches, brightly lighted, and suitably warmed in cold weather. The choice of a room is of importance, for the success of the club will often depend upon it. If the room is cold and cheerless it will damp the ardour of even the most enthusiastic members.

The Club Room

If any difficulty is experienced in obtaining a room, and if there is no boys' club in the district, you might make application for a room belonging to a Church, Chapel, or Institute. A schoolroom would be quite suitable if one is available. It is surprising how kind people are when they know what is wanted and why it is required. A polite request and a clear statement of the facts of the case will seldom fail to secure the use of a suitable room, if it is at all possible. Even if you do not succeed at the first attempt you should not give up trying. Once it is realised for what fine objects the Meccano Guild stands, and the good it will do in the district, a room should soon be forthcoming.

If you have any difficulty in the choice of a Leader or in obtaining a suitable room, you should write to me. I am in touch with many influential gentlemen in all parts of the country who may be able to find someone willing to act as Leader. At any rate, I shall be able to send you the names and addresses of Guild members in your district, and by visiting or writing to them you will gain new members, some of whom may be able to suggest a suitable Leader, or where a room may be obtained. Do not forget that in the Guild Headquarters staff every member has real helpers and friends.

One other point. Whilst I am always ready to give a hand in any difficulty, I want you to realise that you must only appeal to me as a last resource. The successful working of a club depends upon the Guild members on the spot. Unless they are prepared to work hard, both in the formation of the club and afterwards, no club will be successful. "What is worth doing at all, is worth doing well" is an old saying that continues to hold good in regard to many things, and in regard to running a Meccano Club in particular. If the members are keen and enthusiastic they will nearly always be able to arrange for both a Club Leader and a club room without having to seek my assistance.

Having decided the above-mentioned details, the next thing to do is to draw up the club rules. Although all are agreed that rules relating to the conduct of members at meetings are essential, it is not suggested that rigid discipline be exercised. Members must, however, be made to realise that disorder and rowdyism will find no place in a Meccano Club. Ordinary conversation and freedom to move about at model building meetings should generally be permitted, for the members' enthusiasm will soon evaporate if the club is run on the lines of a school-room. Let every member enter into the spirit of the club, and remember that each is able to contribute materially to the others' happiness by gentlemanly behaviour. It should be made clear, too, that all movement and noise should cease if the Leader or Secretary wishes to address the members. Respect and obedience to the officers of the club must be given by all members.

Rules for Meetings

Meccano Club Leaders

No. 12. Mr. S. R. CARLILE

Founded in December, 1921, the Parkstone Congregational Meccano Club largely owes its present satisfactory position to the enthusiasm and energy of its



Leader, Mr. S. R. Carlile. Commencing with a membership of 18, the Club made such splendid progress that affiliation with the Guild was granted in February of the year following its inception. Since that time the Club has never looked back, and its work has been most successful.

Mr. Carlile is one of the rapidly-increasing number of Club Leaders who believe in keeping their members together during the summer months. Some time ago he introduced a Gymnastic and Physical Drill Section, which have proved very popular. In addition to the usual club activities the Parkstone M.C. also runs a Concert Party and (in season) Football Team. Wireless is an important and very popular item in the club programmes.

Sometimes it may be difficult for members to obey some ruling—they may think to themselves "Who is X that he should say 'do this' or 'do that'?" Remember then that you are obeying him not as the individual, but by virtue of the office he holds, to which office he has been elected by all the members. In the Army, men may sometimes dislike their officers, but they remember that they are the representatives of their King and Emperor, whom they have sworn to serve faithfully and well, and because of this they sink personalities and cheerfully carry out the officers' orders.

Obey the Club Officials

It is impossible to lay down hard and fast rules for the guidance of a club. This is only possible to those who are on the spot and who are consequently familiar with local conditions. The requirements of each club differ from all others. These differences are principally those of environment and the type of boy of which the club consists. Each club, therefore, must establish itself, draw up its own rules, and run its own affairs in the manner that is considered most suitable.

(To be continued)

Club Notes—(*cont. from page* 106)

Wynberg (S. Africa) M.C.—A meeting was recently held to welcome the South African agent of Meccano Ltd., on his visit to Capetown. The attendance was the highest on record, and there were as many adults present as Guild Members. During the proceedings, the Chairman, Mr. Mansergh, C.B.E., made a very impressive speech which was afterwards reported in the Press, together with an account of the meeting. An inter-club model contest was also recently held between this club and the Observatory M.C. which was voted a complete success by members of both clubs. *Secretary:* Mr. A. J. Lewis, Wynberg Park, near Cape Town, South Africa.

The Torque Converter—(*cont. from page* 91)

features of this Meccano model, and to watch it operate is a fascination that will delight everyone with engineering interests. The turning movement delivered to the back axle is in the nature of a number of impulses given by the pawls to the gear wheels. In the Meccano model these impulses vary from about twelve teeth of the gear wheels (on what is equivalent to top gear) to one or two teeth, when great power is required to overcome considerable resistance.

In Fig. 1 and in the Meccano model of the gear, we have used a ratchet composed of pawls and gear wheel. It should be pointed out that in the actual Constantinesco Torque Converter, ratchets and gear wheels are not employed for the drive. Instead a system of "uni-directional valves" is being perfected by Mr. Constantinesco, and these form the subject of a separate patent.

As mentioned at the commencement of this article, the fact that it has been possible to build this Torque Converter with Meccano is a splendid illustration of the adaptability of Meccano parts. There is no movement known to which the Meccano system may not be applied with success, and as the Torque Converter will undoubtedly be very much in evidence in engineering in the future we earnestly commend every Meccano boy to study this remarkable invention. There is no better method of understanding the working principle of the Converter than that of building this model with standard Meccano parts. The time spent will well repay every reader, and will enable him to explain the working of the Converter to his parents and friends when next it is mentioned in the newspapers.

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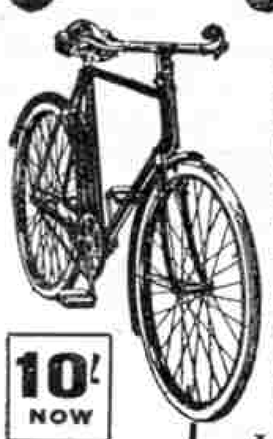
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The Call of the Open Road

by "ROVER"

NOW that the evenings are lengthening, every boy will be out of doors as much as possible, and for the boy with a bicycle, the next few months will be the happiest of the whole year. Up with the sun every morning, and out on the road before the rest of the family are properly awake, even familiar surroundings appear wonderfully changed in the early morning.

The Joys of Cycling

There is nothing more exhilarating than a swift run through the countryside on a fine spring morning. It gives one a healthy appetite for breakfast and clears the brain ready for the day's work. It is well worth while getting up early to enjoy the experience.

To appreciate cycling to the full you must have perfect confidence in your machine, and this is only obtained by giving it some amount of care and attention. The keen cyclist regards his machine with the same importance that a soldier regards his rifle, and he pays as much attention to keeping it clean and in good order.



This novel fancy-dress was awarded a prize in a recent cyclists' carnival. The idea may prove of interest to readers of the "*M.M.*" for future carnivals and fetes. Supplies of coloured streamers and other advertising matter, with which to decorate the cycles, may be obtained free of charge from the Editor of the "*M.M.*"

Bearings should be kept well oiled, wheel-rims and mud-guards free from dirt and rust, lamps in good condition, and above all, the chain should be carefully looked after. Some boys consider it "too much fag" to clean down their machine when they come in from a long run on a wet and muddy road. The result is that rust sets in and, if it is not removed, the life of even the finest bicycle will quickly be shortened, and its appearance spoiled. To the true lover of cycling, however, the care of his machine is a real pleasure, and he will spend many an hour cleaning, oiling and adjusting, so that when he sets out on a run it is with absolute confidence in the reliability of his mount.

Care of Ball Bearings

An important point to remember is the care of the ball bearings, the use of which was recently explained in the "*M.M.*" As there are sets in both bicycle-wheel hubs, as well as in other places in the machine, the young rider should know how to take down a wheel without losing the small steel balls.

The nuts that hold the wheel in its fork are unscrewed and the hub caps are taken off. Before pushing the spindle out, the wheel should be slanted over a little and the balls allowed to drop into the hand, and the process repeated with the other side of the hub. To replace the wheel in position again, the hub should be first filled with thick grease and the balls embedded in it, around the axle hole and in the ball race. The grease holds the balls in position while the wheel is re-assembled.

If one or two of the balls are lost in the process do not replace them with odd or old balls. Usually it is better to purchase an entirely new set, as the balls are manufactured to such an accurate degree that the slightest difference in size will throw the whole bearing out. The odd balls may not be quite so much worn as those left in the hub and so will take on more than their share of work, and probably break under the additional stress imposed upon them.

There are many ways in which cycling may be made even more enjoyable and interesting, such as by adding a Veeder cyclometer, which tells you numerous important particulars of your run, or by fitting a three-speed gear, which immensely increases the riding comfort and capabilities of your machine. Particulars of such accessories and of their fitting and upkeep, will be given on this page from time to time.

Other cycling chats will include "Forming a Meccano Cycling Club," "The Cyclist's Tool Kit," "Mending a Puncture," and "Choosing the Day's Run." Meanwhile any reader who desires any information on cycling matters or is in any difficulties with regard to his machine or its equipment should write to the Editor of the "*M.M.*" for assistance. Answers to questions likely to prove of interest to other cyclists will be published on this page.

ESSAY COMPETITION FOR MECCANO CYCLISTS

We announce a special Essay Competition for Meccano Cyclists, the subject being "The Ideal Bicycle." Competitors should describe the kind of bicycle they would best like to own ; whether three speed, two speed or single speed ; dropped handle bars ; with or without chain case, etc. Essays should not exceed 500 words and should be posted before May 30, addressed "Cycling," c/o *Meccano Magazine*, Binns Road, Liverpool. The prize will be a Veeder "Regular" Cyclometer.



The MECCANO CHAMPIONSHIP COMPETITION

21 Cups & 460 Medals: total value £250



AS already announced, the Meccano Model-Building Competition is this year divided into the following groups:—(1) Great Britain. (2) Australasia, South Africa, Canada, India, and all Countries within the British Empire. (3) *America. (4) *France, Belgium and Switzerland. (5) *Scandinavia and Holland. (6) *Italy. (7) *Spain and Portugal.

In each of these groups, three splendid Championship Cups will be awarded for the best models submitted, and the winner of each Cup will hold the title of "Meccano Champion" for his particular group and section for twelve months from the date of the awards. Each Cup will be engraved with the name of the winner, and will form a valuable reminder of his prowess and skill.

(*Including Colonies*).

In addition, there will be Silver and Bronze Medals in each section and Certificates of Merit to a limited number of other entrants. The total value of the prizes to be awarded will amount to £250.

Complete List of Awards

SECTION A.—For competitors under 10 years of age on April 15 next. Championship Cup. 20 solid Silver Medals. 50 Bronze Medals.

SECTION B.—For competitors over 10 years of age and under 14 years of age on April 15 next. Championship Cup. 30 solid Silver Medals. 100 Bronze Medals.

SECTION C.—For competitors over 14 years of age on April 15 next. Championship Cup. 60 solid Silver Medals. 200 Bronze Medals.

In all there will be 21 Championship Cups, 110 Silver and 350 Bronze Medals awarded.

Meccano Gold Medallist

The competitor who, in the opinion of the Judges, submits the best model in the entire Competition, will be awarded a solid Gold Medal, and will hold the title "Meccano Gold Medallist." His name and the year in which he gained the title will be engraved on the medal, which will remain his own property.

Ask your dealer or send to us for an Entry Form. Post free from Meccano Limited, Liverpool.



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PRIZE COMPETITIONS



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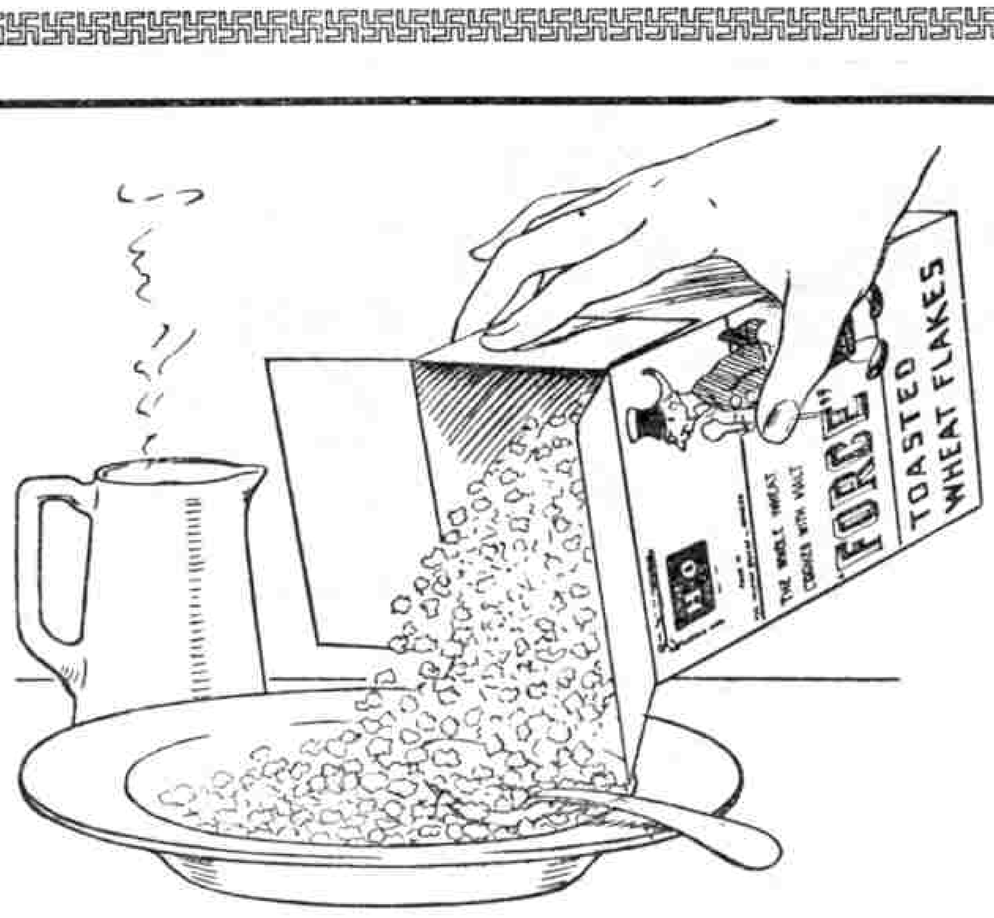


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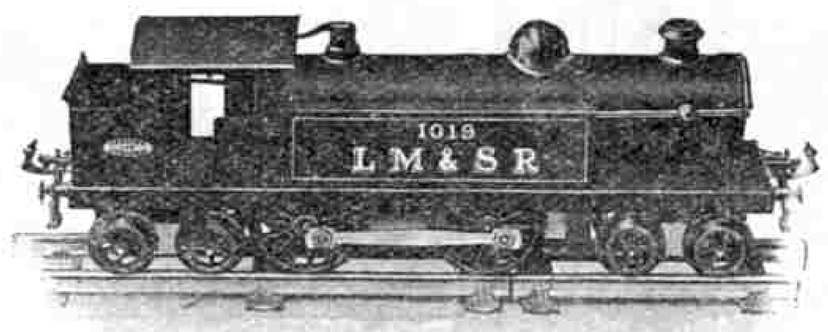
Boys! this is easy

If you can add hot milk and sugar to a plate of "FORCE" you can get your own breakfast. If you do this to-morrow you will not only save mother a lot of bother, but you will have the finest meal you ever had in your life. Ask mother to be sure to get the packet with "Sunny Jim" on it. *Prove* how nice it is. Send now, to "Sunny Jim," Dept. A.Y.S, 197, Great Portland Street, London, W.1., for a *free sample.*

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WHOLE WHEAT FLAKES
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This magnificent Tank Loco is a splendid addition to any train system. A glance at the above illustration shows how beautifully this Loco is designed. It is thoroughly representative of the latest type of its class. Measuring 11½ in. in length, it embodies all the characteristics of the Hornby Trains. Suitable for 2 ft. radius rails only.

Beautifully finished in colours; lettered L.M.S and L.N.E.R. Fitted with reversing gear, brake and governor.

Price each **32/6**

FROM ALL MECCANO DEALERS

Competition Corner

Competitions are now a strong and popular feature of the "M.M." Some splendid new ones are being prepared and will be announced in our future issues. On page 109, particulars are given of the £250 Championship Contest for the best models, which every reader of the "M.M." should enter.

Which is Your Favourite Model?

A NEW ESSAY COMPETITION

THE various essay competitions that have been announced from time to time in the "*M.M.*" have been so successful that it has been decided to run a further essay competition, the subject of which is

"MY FAVOURITE MODEL AND WHY I LIKE IT."

Essays should not exceed 500 words and should be written on one side of the paper only. The competitor's name and age should appear on the back of each sheet, as it is possible that odd sheets may get astray if they do not bear the author's name.

The competition will be divided into two sections :—

(A) Boys under 12 years of age.

(B) Boys of 12 years of age and over.

A prize of a Hawk-Eye camera will be awarded in each section. These cameras takes pictures $3\frac{1}{4}'' \times 2\frac{1}{4}''$, and are manufactured by the Kodak Company. The closing date is May 30 in the United Kingdom, and for entries Overseas August 30.

This is the first of several essay competitions that will be announced, and it affords an excellent opportunity for Meccano enthusiasts to describe their favourite models. Competitors will please remember that the task of judging the entries is rendered easier if the essays are neatly and clearly written.

Seventh Photographic Competition

CLOSING DATE: APRIL 30

We are able to announce another photographic competition. This is our Seventh Photographic Competition, and, as before, there will be no restrictions except that the photographs entered must have been taken (i.e., exposed) by the entrant. The plates or films may have been developed or the prints made by others. This fact must be stated on each entry, however, as naturally if two photographs tie for first place, preference will be given to the one that is the sole work of the competitor.

The subject of the present competition is :—

AN OUTDOOR SCENE

and the contest will be divided into two sections :

(A) For those of 16 years of age and under, and

(B) For those over 16 years of age.

The Prize will be goods to the value of 10/6, to be chosen from our catalogue by the winner. Closing date: April 30 next. (For Overseas Readers: July 30).

Result of Essay Contest

"*What I intend to be and Why*"

Readers the world over have heartily entered into the spirit of this competition, and have helped to make it one of our most successful Essay Contests. It has been very interesting indeed for me to read of the ambitions and intentions of Meccano boys, and there seem to be very few who have not definitely made up their mind which career they intend to follow. Civil, electrical and marine engineers; soldiers, sailors, farmers, ranchers, novelists, astronomers, wireless experts, deep-sea divers and even undertakers, are some of the careers chosen and praised by the competitors.

On the whole the standard of the entries was exceptionally high, and although some competitors wandered away from the subject—to discuss and describe at length various other careers which they *might* adopt—the majority kept well to the point, and some remarkably good essays were submitted.

We have pleasure in announcing herewith the results of the entries for the United Kingdom. Master Harold Parker, of Buckley, nr. Chester, wins the First Prize of Meccano goods to the value of £1 1s. 0d. for his essay on "Teaching as a Career." Three Hawk-Eye cameras (made by Kodak Ltd.) have been awarded to the following competitors, whose entries were next in order of merit :—

Miss Diana Meek, London, W.1.

Master John D. Boyd, Giffnock, nr. Glasgow.

Master Donald Murdock, of Ealing, London.

Essays by Stamp Collectors

"*Why I Collect Stamps*"

Stamp collecting is certainly a very interesting subject to write about, and Meccano Stamp collectors have undoubtedly made the most of their opportunity. Thousands of readers of the "*M.M.*" collect stamps, and the entrants for this competition were all unanimous in praise of their hobby, which in nearly every case comes second only to Meccano itself. Several competitors, carried away by their enthusiasm, went into long descriptions of various rare and beautiful stamps, quite forgetting to explain *why* they were stamp collectors. These absent-minded enthusiasts, however, were the exception rather than the rule, and many good essays were received. The prize of a 10/6 packet of stamps to be chosen by the winner himself from any firm advertising in these pages, has been awarded to Master Leslie Dugdale, of Hull, who chose the "Worth More" Packet advertised in our Christmas number by Messrs. Errington & Martin.

Result of Drawing Contest

Apparently no two readers of the "*M.M.*" agree as to the appearance of the Editor, for entries in the Drawing Competition have been as different as they were numerous. Hundreds of drawings showed fat editors, thin editors, young editors and old editors, with either red, white or black hair! Some of these entries were very humorous indeed, and the Editor has had many hearty laughs these last few weeks. Many were really clever sketches, but a few were so complicated that the judges did not know whether they were entries for this contest or sketches of new Meccano models!

The First Prize in Section A has been awarded to Master Norman Shacklock, of Longsight, Manchester, for a particularly clever black and white sketch, and a Hawk-Eye Camera has been sent to him. The Second Prize in this Section was won by Master H. W. Vaughan, of Blaenau Festiniog, North Wales. In Section B, the First Prize of a Hawk-Eye Camera was awarded to Master Eric Mitchells, of Stockton-on-Tees, and the Second Prize in this Section to Master Richard Waterston, of Newcastle-on-Tyne. We hope to publish one or two of the wnining entries in the next issue of the "*M.M.*"

Result of Sixth Photo Competition

The winner of Section A in this competition—for the best indoor photograph of a Guild member building a Meccano model—is Master George Salisbury, of Martock, Somerset, to whom Meccano goods to the value of 10/6 have been awarded. The prize in Section B, for competitors over 14, has been won by Master Norman Onset, of Hull, for his photograph of a group of Guild members. As all photographers know, satisfactory photographs are very difficult to secure in a room, but the winning entries showed a good knowledge of lighting. Particulars of the Seventh Photographic Competition are announced on this page, and readers are advised to send in their entries at once.

FOR OVERSEAS READERS

Essay Competition for Stamp Collectors

Our last essay contest (the result of which is announced elsewhere on this page) clearly showed that there are many thousands of keen stamp collectors among readers of the "*M.M.*," and it has been decided to hold another essay competition. This time the subject is "*My Favourite Stamps and Why I Like Them.*" Some special set, or stamps of a certain colony or even stamps of a country should be chosen and described, and the reasons for your choice given. The essay must not exceed 500 words and is to be written neatly on one side of the paper only. Envelopes containing the entries should be marked "Stamp Contest" in the top left hand corner and sent to the Editor of the "*M.M.*," Binns Road, Liverpool.

The first prize will be stamps to the value of 10/6, to be chosen by the winner himself from any firm advertising in the pages of the "*M.M.*" Make your choice when you send in your essay, and give full particulars of the stamps required, so that the prize may be sent direct to you in the event of your success. Closing date for Overseas Readers: June 30, 1924.

Result of Fifth Photo Contest (Overseas)

Photographs from all over the world were entered in this popular competition, and the judges had a difficult task in choosing between photos of Egypt, Rome, and Naples; the ruins of Pompeii; Indians, wild animals, pets and many other subjects. In Section A, a good photograph of the Public Bathing Place and "Castel dell 'Oro" at Naples, submitted by Master Gerald Briffa, of Valetta, Malta, was awarded the First Prize (a Hawk-Eye Camera, made by the Kodak Company). Second and Third Prizes in this Section were won by Masters Ahmed Shawky (of Cairo, Egypt), and P. S. de Wet (of Pretoria, South Africa), for their respective entries of "Houseboats on the Nile" and "The Union Buildings at Pretoria." In Section B, Master E. H. Whitney (of East London, South Africa), wins the First Prize for his clever study of a pet pony. Meccano goods to the value of 5/- have been forwarded to Master H. C. Manchanda (of Lahore M.C., India), and Master Jack Haysom (of Victoria, Australia), as Second and Third Prize Winners in this Section. We congratulate these prize winners on their well-merited successes.

Small Advertisements

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ADVICE, HANDBOOK & CONSULTATION FREE. King, Registered Patent Agent, 146a, Queen Victoria Street, London, E.C.4. 37 years' references.

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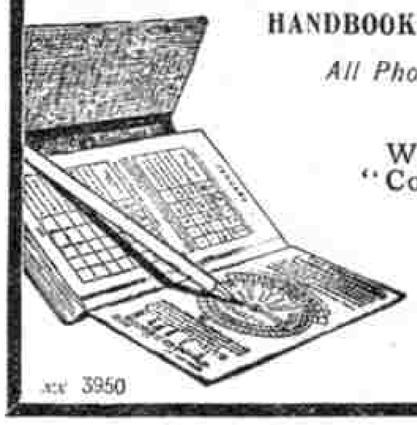
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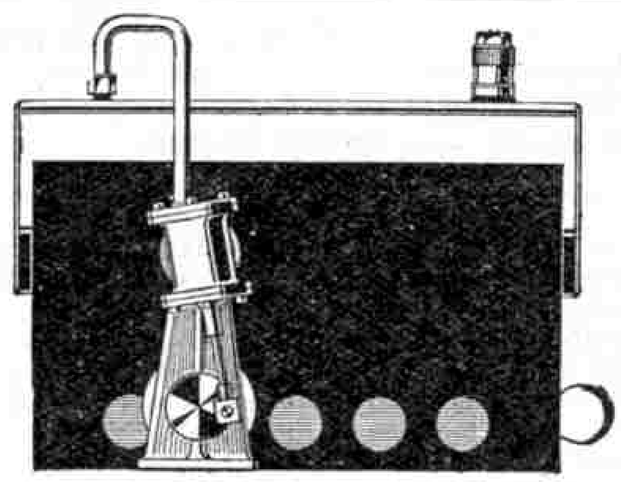
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* * *

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* * *

Small advertisements are inserted in these columns at 1/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order.

Obtaining the "*M.M*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 2d. per copy, or mailed (post free) direct from Liverpool, 1/6 for six issues, or 3/- for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

CANADA:	Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA:	Messrs. E. G. Page & Co., 379, Kent Street, Sydney.
NEW ZEALAND:	Messrs. Browning Ifwersen Ltd. P.O. Box 129, Auckland.
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RESULT OF FAIRYCYCLE COMPETITION

SO many children entered this competition and so many good essays were sent in that we wish we were able to award many more prizes than promised, but we cannot afford to be as generous as we desire, and must, therefore, conform to the terms of the competition by awarding three Fairycycles as prizes to the three successful competitors.

We would compliment a great number of those who entered very interesting stories but who just missed reaching the standard of those who won. To these we would say do not be too disappointed, keep on trying to do your best, and you will succeed in other ways although you have been beaten this time.

Names and Addresses of Winners	Shops
Royal Goulding (7½ yrs.), 4 Vale View, Claremont Road, Bath.	To be supplied through Halford Cycle Co., 5, Stall Street, Bath.
Jack Little (6 yrs.), 2, Dunelm, Sunderland.	To be supplied through Messrs. Binns Ltd., Fawcett Street, Sunderland.
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We may have another competition next month, giving *cash* prizes to successful boys and girls who are owners of a Fairycycle, therefore

Ask Father or Mother to buy you a Fairycycle now



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FAIRYCYCLE

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Insist on these :—Cone Bearing Steering Head, Brake, Freewheel, Adjustable Chain by means of Pedal Bracket (*you know how all chains stretch*). Reinforced Seat Pillar, Ball-Bearing Rubber Pedals, Mudguards—Back and Front, Highly-plated Fittings.

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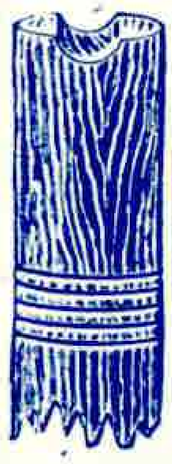
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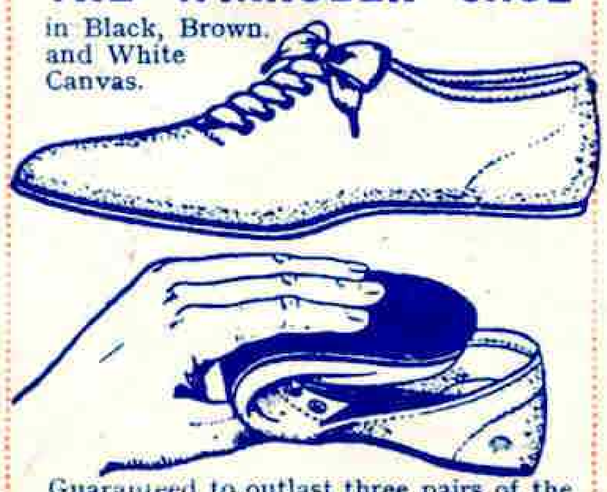
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Carriage extra.



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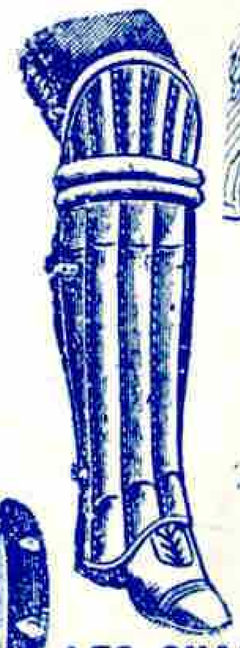


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